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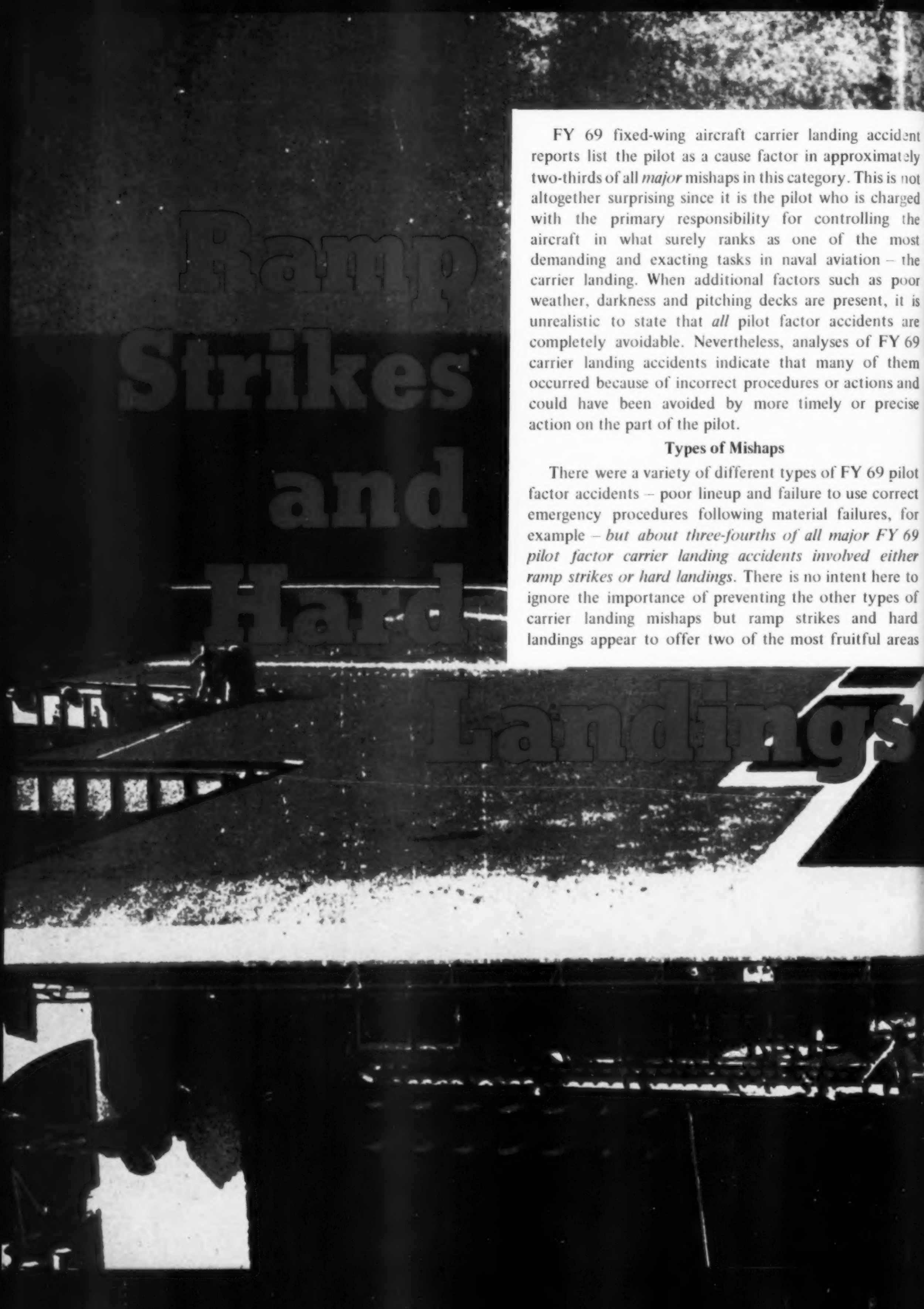
FEBRUARY 1970 THE NAVAL AVIATION SAFETY REVIEW

Ramp Strikes and Hard Landings



FY 69 fixed-wing aircraft carrier landing accident reports list the pilot as a cause factor in approximately two-thirds of all *major* mishaps in this category. This is not altogether surprising since it is the pilot who is charged with the primary responsibility for controlling the aircraft in what surely ranks as one of the most demanding and exacting tasks in naval aviation – the carrier landing. When additional factors such as poor weather, darkness and pitching decks are present, it is unrealistic to state that *all* pilot factor accidents are completely avoidable. Nevertheless, analyses of FY 69 carrier landing accidents indicate that many of them occurred because of incorrect procedures or actions and could have been avoided by more timely or precise action on the part of the pilot.

Types of Mishaps

There were a variety of different types of FY 69 pilot factor accidents – poor lineup and failure to use correct emergency procedures following material failures, for example – *but about three-fourths of all major FY 69 pilot factor carrier landing accidents involved either ramp strikes or hard landings*. There is no intent here to ignore the importance of preventing the other types of carrier landing mishaps but ramp strikes and hard landings appear to offer two of the most fruitful areas

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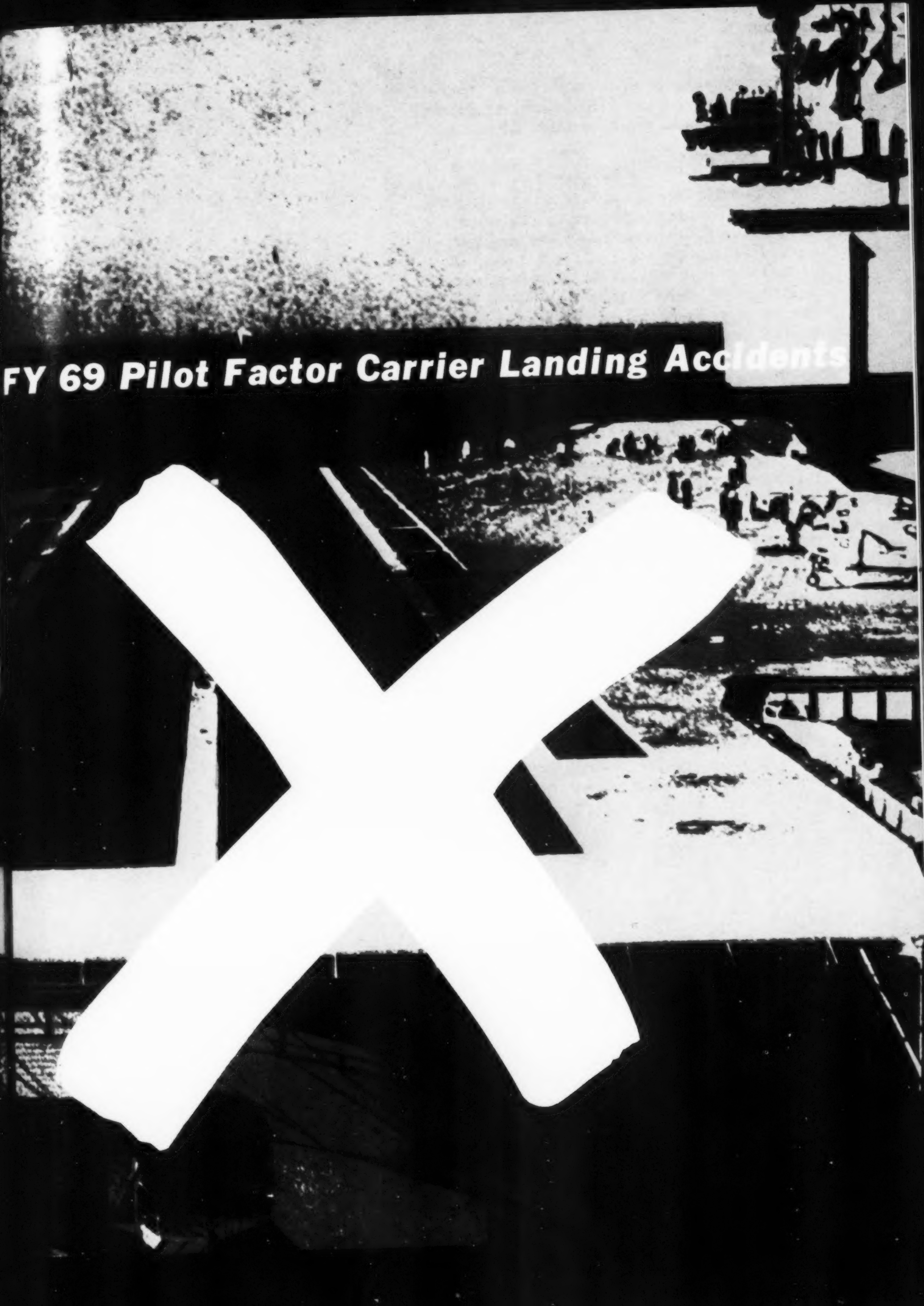
FY 69 Pilot Factor Carrier Landing Accidents



for the application of individual accident prevention efforts. For this reason, the remainder of this article will be devoted to a more detailed discussion of these two particular types of mishaps.

Ramp Strikes

Ramp strikes were the predominant type of pilot factor accidents during night carrier landing operations and hard landings predominated in day landing accidents. To expand on this statement, 10 out of 27 night landing accidents in which the pilot was listed as a cause factor involved ramp strikes. In addition, in two other night landing accidents the aircraft missed the ramp but landed hard and short of the No. 1 wire. In still another case, the aircraft fuselage and landing gear missed the ramp but the tailhook did not. Altogether, ramp strikes were far and away the most prevalent single type of night carrier landing accident. By contrast, ramp strikes were involved in only three of the 33 *day* carrier landing accidents in which the pilot was listed as a cause factor.

Ramp strikes can result from a variety of pilot actions – spotting the deck; steep turns in close; dropping the nose in close; excessive power reductions when working off a high in close; and, of course, being low and/or slow at the ramp. The fact that ramp strikes occur less often in the daytime than at night is probably due to the fact that errors can be recognized earlier and are more easily corrected during day operations than at night because of better visual cues.

One important reason for the late recognition of errors at night by the pilot is due to the visual stimuli to which he is exposed; specifically, deck lighting. The area of the flight deck as shown by night lighting, whatever its shape, appears smaller than does the total deck as seen in the daytime. One of the ways that people judge the distance of an object is by its apparent size. In this way the pilot knows he's getting closer to the deck – because it keeps getting bigger and bigger. At slant range X from the ramp the apparent area of the total angle deck is, let us say, Y square feet. At night the area rimmed by lights is smaller so that at the same slant range X the landing area will appear smaller than Y. The pilot, relying unconsciously on his recollections from the daytime, may mistakenly feel that since the area is smaller than Y, the slant range (hence altitude) is greater than X. In other words, the small area seems far away and he feels like he is too high. In addition, the difference in apparent shape (ratio of length to width) at night in comparison to the shape visible in the daytime may also cause the pilot to feel that he is higher than he actually is.

This is, of course, a vast simplification of only two of several factors to be considered in connection with flight

Some errors in close are beyond correction.

deck lighting and/or night illusions. It should be noted here that the development of improvements in flight deck lighting (and other lighting aids to carrier operations) is the subject of intensive study at several levels of naval aviation at the present time. The USS HANCOCK, for example, has recently completed evaluation of certain flight deck lighting changes designed to provide the pilot with a nighttime picture of the landing area which is more comparable to what he sees in the daytime than is now the case. Hopefully, these studies will result in improved lighting for carrier operations but, even so, it is expected that night carrier landings will continue to be extremely demanding of the pilot. The individual pilot must, therefore, continue to exert the strictest self-discipline by ignoring perceptual errors, by relying upon every available optical landing aid, by responding to LSO calls in a timely manner and, above all, by flying his aircraft so as to preclude the need for radical power and altitude changes, particularly in close to the ship.

Hard Landings

Generally speaking, it may be said that hard landings (day or night) result from the same type of errors which produce ramp strikes. That is, approaches where the aircraft develops an excessively high sink rate in close. The fact that in the daytime these approaches result in hard landings more often than they do in ramp strikes is

probably due to the fact (already mentioned) that daylight provides sufficient visual cues to allow more effective (although not necessarily completely successful) corrections. The result is that the aircraft does succeed in getting safely over the ramp but still lands hard. It is important to note that there is a point in any approach beyond which no effective correction is possible – day or night. This is especially true where the pilot makes a last minute, gross, incorrect change in power, attitude or lineup. In these cases the LSO may issue a waveoff but even this may not be effective in preventing an accident. It is noteworthy that 10 out of 19 FY 69 daytime hard landing accidents involved inflight engagements – and in almost every case the pilot was in the process of attempting a waveoff when the inflight engagement occurred. In a number of other mishaps the pilot was also attempting to execute a waveoff but due to an excessive sink rate, still landed hard (usually in an excessively nose-high attitude).

Excessive Sink Rates

Excessive sink rates blow tires, smash wheels, collapse landing struts and cause ramp strikes. How do they come about? It all goes back to the basics: power plus attitude equals performance. Not enough power or an incorrect nose attitude are the only factors which can cause an excessive sink rate. The usual case of an excessive sink rate is manifested as "going for the deck." This phrase is actually an oversimplification of the problem since there are several forms of "going for the deck." Diving for the deck, coming down at the ramp and spotting the deck are a few. Let's consider these in more detail.

Diving for the Deck. – Here the pilot makes an intentional effort to land the aircraft in the wires with no regard for the meatball, feeling that if he continues his approach with the existing rate of descent he will bolter. Pilots who consciously dive for the deck are perhaps callous to the effects of the resulting hard landings on airframes, are forgetful of the aerodynamic facts of life or are not of the professional school which advocates "taking your bolter like a man."

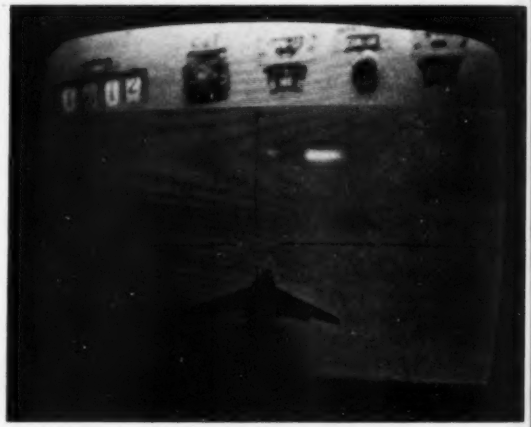
In the daytime many pilots may be able to "go for it" successfully – up to a point. They ease the nose down, then try to stop the rate of descent just before touchdown. The first time a pilot succeeds in diving for the deck may be the beginning of trouble. He may rely on this procedure again and again (nothing encourages repetition like success). He may use it to correct larger and larger errors or may resort to it earlier and earlier in the approach. Carried to its logical and tragic conclusion, the pilot *ensures* that he gets aboard by coming down at the ramp and hitting it. Under stress, a pilot who has been continually diving for the deck may forget that he is still up to 200 feet astern of the ship when the ramp disappears under the nose of his aircraft and he feels that he is safely over the wires.

Continued

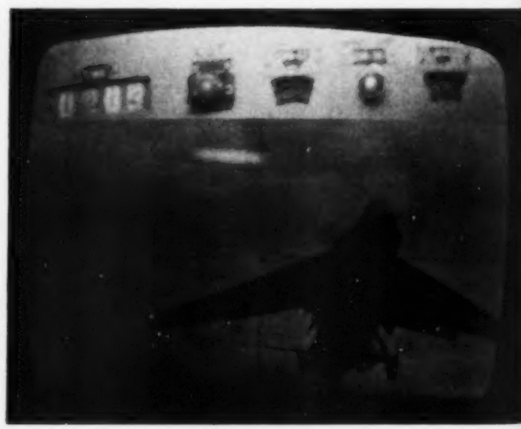
Typical result of nose-high arrestment.

Excessive sink rate.

Low



"Waveoff"



Overrotates

Coming Down at the Ramp. – The aircraft has not yet arrived at the landing area and the pilot is in that most critical area where the LSO can no longer help him and he is committed to land. He may then set up a grossly high sink rate, with stick and/or throttle. Why? It must be either that he ignores the glide slope information given him by the meatball or that he is unable to stay on the slope. The first case is *intentional*, the second *unintentional*. Coming down at the ramp deliberately seems, on the face of it, to be absurd. Who would want to increase his chances of hitting the ramp? Probably the biggest cause is experience – experience in diving for the deck successfully. Add to this experience the effects of overdetermination to get aboard, fatigue, bad weather, low fuel, darkness and its illusions of heights, plus any other distractions and you have a candidate for a ramp strike, or at least, a hard landing.

The inexperienced pilot may come down at the ramp deliberately in a panic situation but is more likely to come down *unintentionally* through poor responses (usually overcorrections) to errors existing late in the approach. Examples include *low* and *slow* in the middle. The pilot may have to use a tremendous amount of power to get back up on glide slope, forcing him to break APC (if his aircraft is so equipped). As he is approaching the correct angle-of-attack, he is afraid that he will go high or fast. He reduces power too soon and immediately starts down again at the ramp, where the margin for error is rapidly decreasing. Another example is the gradually decelerating approach. When close in, if the pilot fails to answer a power call quickly and with a sufficient amount of throttle, he will come down rapidly. There are countless other examples, all of which

are born of inexperience, poor basic airmanship or any other cause which represents unsatisfactory error correction. However, they are *not* intentional errors. It is in this problem area that the early waveoff is the best medicine. Working constantly to avoid gross errors and making proper corrections early, while they are within manageable parameters, is the best prevention technique. This is particularly true in APC equipped aircraft since the need for gross power corrections will force the pilot to break APC and deny him the benefit of this valuable landing aid.

The experience of one F-8 pilot who was involved in a night ramp strike illustrates the hazard of dropping the nose in close:

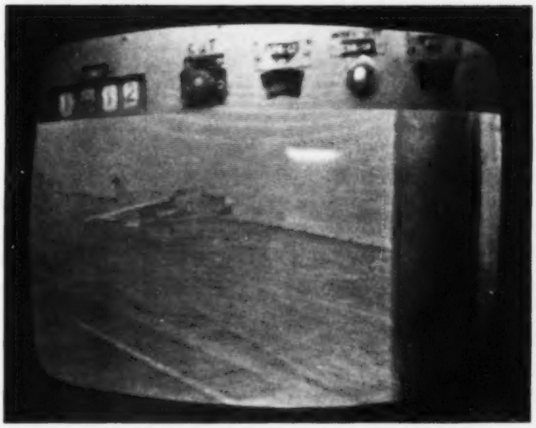
The pilot had experienced a tacan azimuth failure earlier in the hop and as a result had to depend upon CCA for heading information. CCA was late in transmitting lineup information and the pilot had to make a rather large correction to obtain proper lineup initially; however, he only needed one further correction after calling the ball at one mile.

The pilot began his visual approach slightly high, corrected and went high again in close as the deck pitched down. He then dropped his nose; the deck pitched up and the LSO immediately waved him off but the situation had deteriorated too rapidly. The aircraft hit the ramp and exploded as it passed abeam the LSO platform. The pilot ejected while the aircraft was still on deck and after a successful parachute deployment, landed on the bow of the ship.

The controlling LSO's statement said, in part:

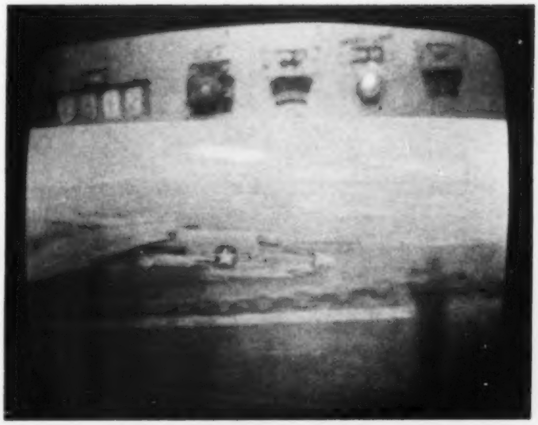
"The pilot called the meatball at one mile and I acknowledged the call by giving the wind velocity. The aircraft went high in the middle and started coming back down. I called "OK, start catching it with power." The pilot responded properly and the higher than normal rate of descent was stopped. The aircraft was a little high in close but with the pitching deck *down*, I thought it was in a very good position. As the deck was starting its up cycle, the nose of the aircraft dropped, as evidenced by the appearance of a red (fast) approach light coming on and the white light on the vertical stabilizer coming into view. A high rate of descent was established and I immediately called, 'Power-Waveoff!' – at the same time actuating the waveoff lights. The aircraft's main landing gear struck the ramp just above the rounddown, with the aircraft in an overrotated attitude, at full power. It exploded abeam the LSO platform and as it slid down the deck I called, 'Eject! Eject!' " (The pilot's ejection was successful, as already mentioned.)

The difficulty of suggesting ways to prevent accidents of this nature is illustrated by a portion of the pilot's statement, which read:



Nose-high touchdown.

Nose slams down.



Cause: Improper waveoff technique.

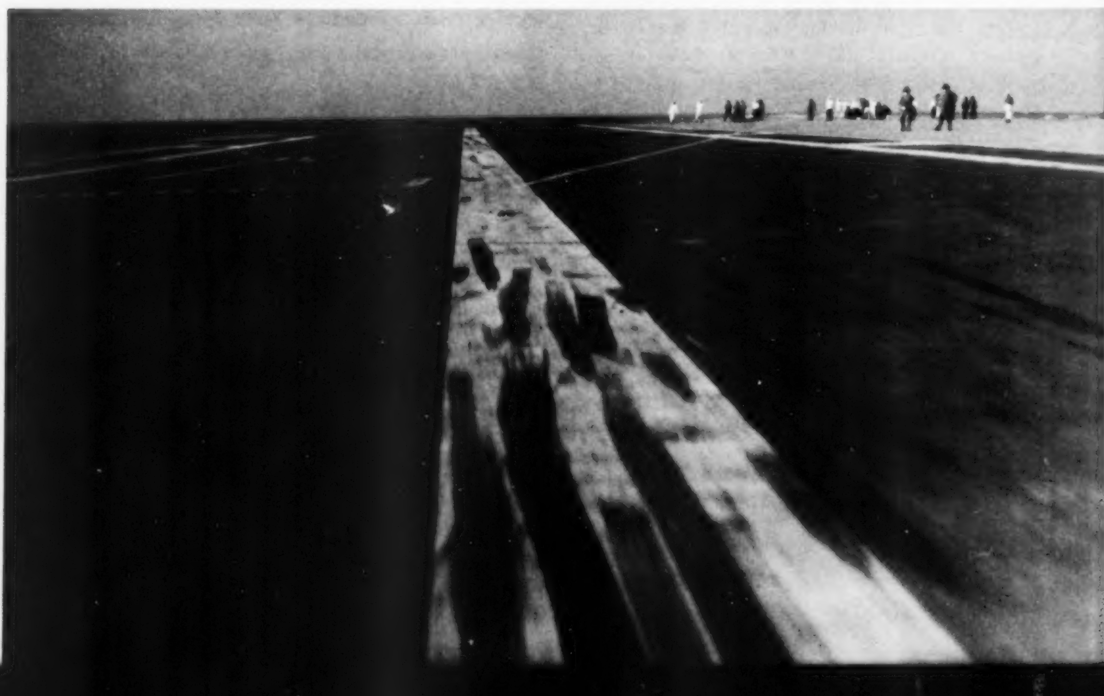
"I really couldn't pinpoint the cause of the accident. Obviously, I dropped my nose when I made a late lineup correction but I've done that enough times before to be wary of it and I was consciously trying to hold it up. The LSO called for a little power so I added some (breaking APC) and the ball looked stable, about a ball high. At this time I was feeling uncomfortable and added 100 percent power. The ball looked stationary for a moment and then started dropping and I didn't know why. Under the same set of circumstances I'd probably hit the ramp again because I could not see a dangerous situation developing until *after* I had gone to 100 percent power."

In the investigation of the accident it was determined that out of the pilot's last 29 landing passes, 20 had involved a drop-nose or come-down in close or at the ramp. As a result the assistant air wing LSO had taken the pilot aside just prior to the hop related here and cautioned him not to repeat these past mistakes. Nevertheless, the pilot did drop his nose in close, precipitating a situation from which there was no escape.

Unconsciously Spotting the Deck. – All carrier pilots do this some of the time – some do it all of the time. This can be the result of a response to a late call for lineup. The pilot looks at the deck and simultaneously the nose may move slightly up or down as he unconsciously reacts to the nearness of the landing surface. The cure seems simple enough – fly the meatball all the way to touchdown. But in practice, too few pilots do this. They know the deck is coming ever closer and unless they use a conscious effort of will, they take a look at the deck and then react to it. Here is how it can happen: The ball starts high in close. The pilot reacts quickly and tries to center it – he doesn't want to bolter on a pass that was going so well until now. As the ball approaches the center of the lens he relaxes. He knows that he won't bolter and he knows the deck is getting close. He looks at it, not seeing the sinking meatball. He reacts to the deck's proximity and he lands the aircraft by himself – usually hard and on an early wire. The pilot swears that the ball didn't go off the bottom – or even go low. For him the statement is true because it was in the center *the last time he looked at it*.

To sum up, most of the pilot factor major fixed-wing carrier landing accidents occurring in FY 69 involved ramp strikes or hard landings. It is recognized that many factors enter into any consideration of carrier landing operations – the diversity of carrier sizes, operational committments, the different models of aircraft embarked, deck and weather conditions, the state of training of the pilots and the experience level of the LSOs. Some of these factors are beyond the control of the individual pilot or LSO but the quality of the individual carrier approach is not. The *perfect* approach time after time might often be more of an ideal than a reality but neither the pilot nor the LSO should be satisfied with anything less than the most professional flying of which the pilot is capable.

The successful approach to a carrier landing depends principally on the individual naval aviator. Make each approach a new one with as much precision and steadiness as you can muster. Consult your LSO regularly and don't let bad habits develop – above all keep on the ball – all the way! ◄



The Ballad of Roger Ball

NOW, as any aviator will tell you, "Roger, Ball" is merely an acknowledgement from the LSO recognizing the fact that the pilot in the groove has visually acquired the "meat ball" and is lined up for landing.

However, when the comma is taken from the "Roger, Ball" acknowledgement, it takes on a kind of personification and thus inspired a USS BORDELON crewmember to write this ode to the heroic "fellow" whose name, at least, is present during aircraft carrier landing operations:

Throughout the day, we monitor the CCA.
Whose name stands out above the rest?
Who never seems to feel distressed?
By whom is BORDELON impressed?
Roger Ball.

Be it jet, or Fudd or even Stoof –
As each plane rounds into the groof –
Who states his name with savoir faire
With pear-shaped tones coming o'er the air?
Who never seems to have a care?
Roger Ball.

What type of man, this aviator,
Who works through movie call and later?
Is he a Hercules in might
With eyes that pierce the blackest night?
A paragon who is always right,
Roger Ball.

We're sure that Moms throughout tne nation
Of sons who serve with dedication
Would rest secure if they could know
Of this man who seems to make things so . . .
This steadfast, staunch and sturdy pro,
Roger Ball.

Courtesy USS BORDELON DD881

Short Snorts

An egotist doesn't think so much of himself, it's just that he thinks so little of other people.
Anon.

Nothing Left to Chance

THE P-3 crew had completed a photo flash training hop and was returning to its Pacific base about 0200 one morning. The weather was CAVU and the crew was enjoying the return leg in a relaxed atmosphere, they were cruising at 250 knots about FL 250. Shortly after leveling off a vibration was felt in the aft section of the cabin. Although it had been experienced in the cockpit it went unmentioned until one of the crewmen reported it.

The plane commander and the rest of the crew made every effort to find out what was causing the vibration. It was constant and it was annoying. It seemed to be more pronounced in the area between the galley and the sonobouy storage area. A thorough inspection was made inside and out – at least as much exterior as possible while in flight. There did not seem to be any rhyme or reason for the vibration. Yet it persisted and was a very real thing. The PPC tried changes in airspeed. He increased his speed about 40 knots, then decreased his speed about 40 knots. No change. The vibration was still present. He then decided to secure his engines one at a time to see if they were the reason for the vibration. The outboards were feathered but there was no change. Then No. 3 was feathered and the vibration ceased. So the PPC finished his flight to base on three.

The maintenance crew checked and double checked but could not find anything out of the ordinary. The prop was checked and found to be normal. The engine was looked over very carefully. Nothing. There wasn't anything out of line or out of rig. A ground check was made and the vibration began when 1500 shp or more was applied. It was decided to fly the plane back to Barbers Point where a more thorough maintenance inspection could be given. All four engines were used for takeoff and the vibration was still there so on climbout No. 3 engine was feathered and the flight again was made on three.

As soon as possible a complete and exhaustive inspection was made; including a recheck of all that had previously been done. Additionally the airframe, gear box and all mounts were boroscoped and a torquemeter run out was performed. Finally the cause of the vibration was discovered. The door of the camera pod (which protrudes from the bottom of the plane) had about 3/4-inch play and was vibrating due to aerodynamic buffet intensified by the slipstream of the No. 3 prop. The actuator was adjusted and a turn up and test flight were successfully made without any vibration.

This is a good example of interest, persistence and super sleuthing – Ed.

Jamming of Control Surfaces

WHILE taxiing from the apron to the runway prior to takeoff, the pilot of a turboprop aircraft noticed that when the inboard propellers were used in reverse thrust to assist braking, numerous small stones were being picked up from the surface of the taxiway. A final check for freedom of controls was made before takeoff and it was found that the aileron control jammed in the full left bank position.

Upon investigation it was determined that numerous small stones had lodged between the

aileron trim tabs and the ailerons.

In view of this, pilots of aircraft having the capability to reverse propeller thrust are cautioned about the possibility of introducing foreign objects (small stones, etc.) into crevices between control surfaces, thereby causing them to jam. – *Based on UK Board of Trade, Civil Aviation Dept. Circular*

Eagle-eye

ON A PRACTICE GCA missed approach, the outside observer noted that the RF-4C's landing gear appeared to take too long to retract. This information was relayed to the pilot via the GCA controller.

The pilot checked his gages and found all hydraulic systems reading normal. The aircraft continued in the pattern but upon rolling out on base leg and putting the gear handle to the down position, a malfunction became apparent. The gear did not indicate DOWN and both the *Master Caution* and the *Check Hydraulic Gages* lights flashed on, with utility pressure going to ZERO.

The pilot subsequently effected a safe emergency landing.

The cause of this malfunction was traced to a leaky right aileron power cylinder.

It may not be possible to give *all* the credit to this sharp-eyed outside observer for saving this aircraft but it is a comforting thought that this member of the team was alert, knowledgeable and direct in notifying the pilot of a matter which, in his demonstrated good judgment, was not right. – *Based on a USAF incident report.*

Maybe I Should Have Stood . .

THE flight lasted only half an hour but it was full of thrills. The first out-of-the-ordinary event took place when the F-4 replacement pilot was unable to maintain correct position while seeking to become day qualified in aerial refueling. When asked by the observer in another F-4 why he was dropping back the RP replied that he was not getting any throttle response on the starboard engine. He secured the engine but soon got a normal relight and moved back in to the tanker and made three dry plugs in six attempts. On the next plug the RP began a faster than normal closing rate that tipped the drogue basket. The basket flipped off the probe, struck the center forward section of the aft canopy and gouged a 2-inch hole in the outer canopy plexiglass. The observer looked him over carefully and determined another plug would be OK. The RP, since he needed only one more plug to qualify, dumped cabin pressure and completed the additional plug. After completing the refueling practice the RP proceeded to Homeplate. His landing was routine but during rollout his drag chute became fouled at about 110 knots, about halfway down the 8,000 foot runway. The pilot improperly applied brakes causing the port MLG tire to blow out and damaging the port MLG door and hydraulic brake line assembly.

The C.O. said, "In view of events for the day . . . one might say the pilot had a bad day. An engine stalled out, the canopy had been gouged and a tire was blown on landing – that's a lot of trouble for one lad, for one day on a half-hour flight. Aerial refueling requires extremely precise flying . . . smooth stick and throttle movements when tanking. The blown tire . . . is an example of improper braking action as a result of not being mentally prepared for a possible fouled chute on every landing."

Heels on the Deck

A FAM student was making his first approach and landing in the P-3B at Crows Landing. He made a smooth touchdown and rolled for about 500 feet when a severe vibration was felt throughout the plane and the plane began to swerve to the left. The plane commander took control and by use of corrective rudder and power held the aircraft straight. At first blown nose tires were suspected; however, as the plane slowed the amount of power required and degree of vibration indicated the port tires had blown. Locked brakes were suspected but after the tires were changed the brakes checked out satisfactorily. Although the student is sure he did not apply brakes it seems to be the only conclusion as to why the tires blew. Tire marks on the runway ceased at about the point where the plane commander took control. *Since the brakes are so sensitive P-3 pilots are cautioned against hard braking at high speeds. – Ed.*

Once a Knight is Enough

"FORSOOTH," sayeth the knight, and riseth from the round table. "Mine 'IN' basket hath emptied into the proper channels. Now is the time to mount the iron bird and soar forth. The month end approacheth and I am short the fourth hour."

So saying, the warrior ariseth from his desk, zippeth into his armor and leaveth that place of cubicles. He traveleth to the place of the roaring birds, signeth the necessary forms and strappeth on a great green canvas bag. Striding around the winged monster, he pulleth here and poketh there in a manner to checketh the firmness of the fowl's feathers.

Seemingly pleased with the condition of the beast, the knight mounteth and doeth various things to the bird's interior which causeth it to roar and shake. It waddleth off to a stretch of black earth, taketh a running leap and soareth upward with a rush of wind.

And there cometh a feeling of great joy to the knight. He zoometh around the sky with abandon until an hour hath gone and it is time to returneth the bird. The warrior descendeth from high places and flyeth beside the black earth, causing the bird to cease its roar. He turneth it toward the alighting path and pulleth down some feathers along the back of each wing. As the bird approacheth the ground, it is seen that one wing flyeth lower than its mate. Some say this is because the wind bloweth across the black earth.

The bird alighteth on one foot, whereupon it launcheth itself into the air again, turneth its nose into the wind and hiteth hard to the extent that its legs spreadeth on the hard ground. Its whirling nose biteth angrily into the black earth and the beast casteth one wing down and slideth along on its belly. The iron monster cometh to a grinding halt and a great quiet descendeth upon that place. The knight dismounteth and woefully regardeth the crumpled bird.

And there cometh a troop of rolling cavalry calling themselves investigators and they taketh measurements and doeth all manner of things to the broken bird. And all who witness the falling of the bird are called and they speaketh long to them and they writeth in the book.

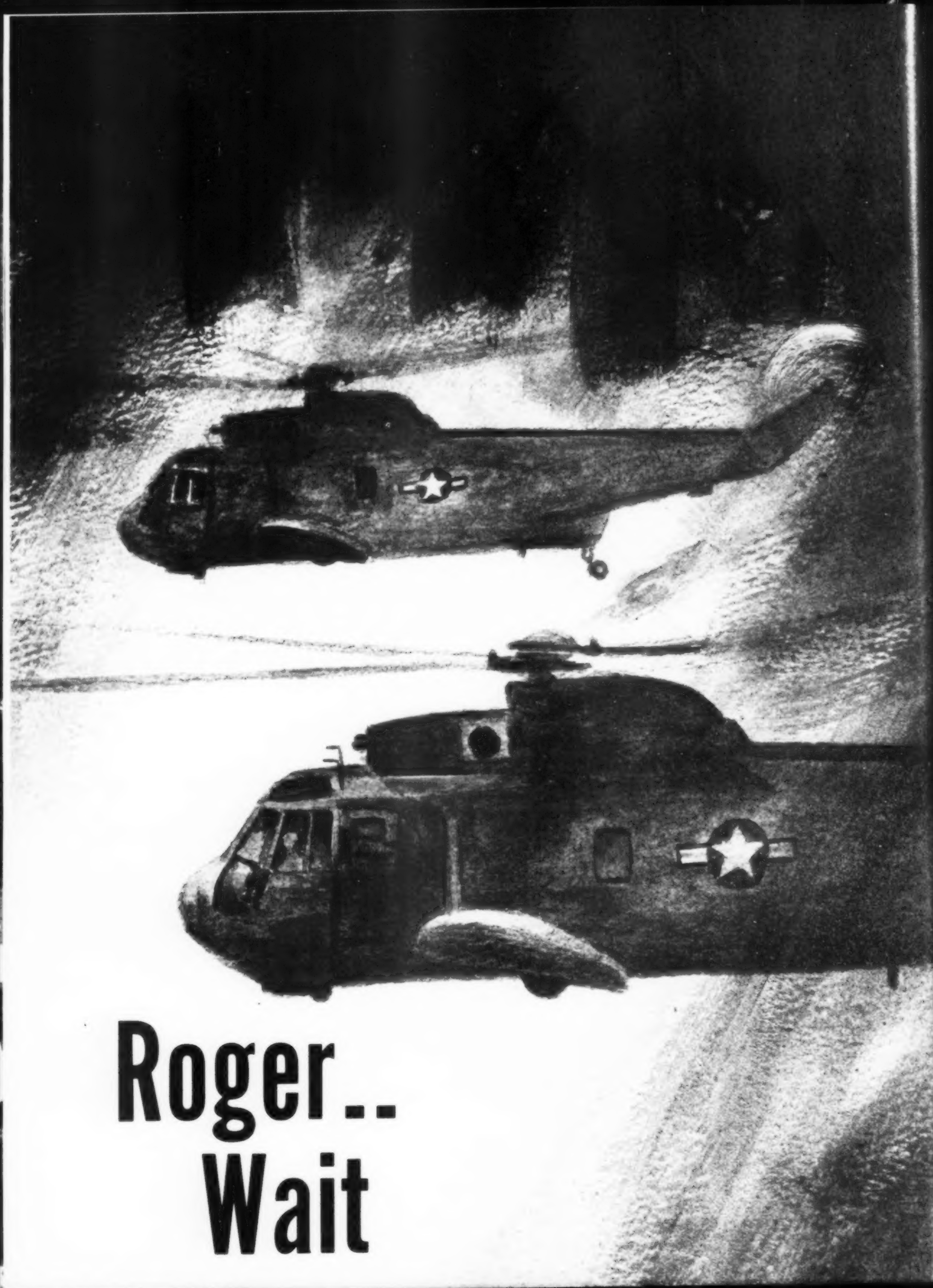
Then, he of the gray beard speaketh to the knight in this manner:

"Verily, verily, I say unto thee, thou hadst lost all directional control and it were better that thou hadst taken this bird again around! It is written that he who bounceth shall encounter the crooked path. 'Tis far better to push the throttle than boot the rudder, for the spur is quicker than the rein.'

"However, the records of thy form indicate thou hast only seven and a half hours of bird time in the last half-year. For this, thy supervisor shall be called to task.

"Go, and when thou comest again to the bird, bring the senior knight that he may instruct thee how to alight thy bird with safety." ◄

Courtesy Aerospace Defense Command



Roger.. Wait

NAVAL aviators, particularly CVA/CVS types, are proud of their ability and each one firmly believes he is No. 1 among aviators. Most tail-hook pilots are a gregarious lot of extroverts who are quick to praise an outstanding bit of airmanship by another, quicker to condemn anyone who slows down the wheels of progress and ready to "clobber" anyone who just plain drags his feet.

Carrier operations have long been recognized as a phase of aviation which requires the Nth degree of teamwork and the finest type of coordination. Sustained operations, around the clock, for weeks on end are not unusual. In the hectic pace of carrier ops, regardless of whether on Yankee station or in the Mediterranean, everyone gets charged up. The human element adjusts quickly to repeated demands for peak physical performance. Despite this, there is one irritating, maddening, common everyday occurrence which sometimes takes the joy out of living. It causes normal, pleasant easygoing pilots to become exact opposites. It causes mild-speaking, mild-mannered pilots to roar, curse and become livid with rage. Yet it is a rather innocuous thing really. It's the necessary matter of calling the tower and receiving the reply, "Roger. Wait, Out."

The following incident occurred one hot, summer day aboard a CVS and concerns, naturally enough, the pilots of SH-3s and "Stoofs." They had been operating day and night and were well into the third week of sustained operations. The pilots and flight crews were on a regular schedule of brief, fly, debrief, eat, sleep and go again. Although the Op Plan called for visual searches it was not unusual for the pilots to spend the majority of their airborne time on the gages. Low ceilings, poor visibility and frequent showers were the rule rather than the exception. The helicopter search areas had gradually been extended farther and farther away from the carrier to distances which now required maximum performance on the part of the flight crews and aircraft.

Late one afternoon a section of three helicopters departed for their assigned search area which was many miles from the ship. On their way they took note of large cloud buildups and frequent showers and realized this would not be a smooth flight. The pilots found the weather in the search area even worse than the enroute weather had been and the section leader decided to return to the ship. All the way back the section flew in and out of thunderstorms and in heavy rain and turbulence. Meanwhile the sun had set and with it the small comfort of seeing and avoiding the heaviest rain areas was terminated.

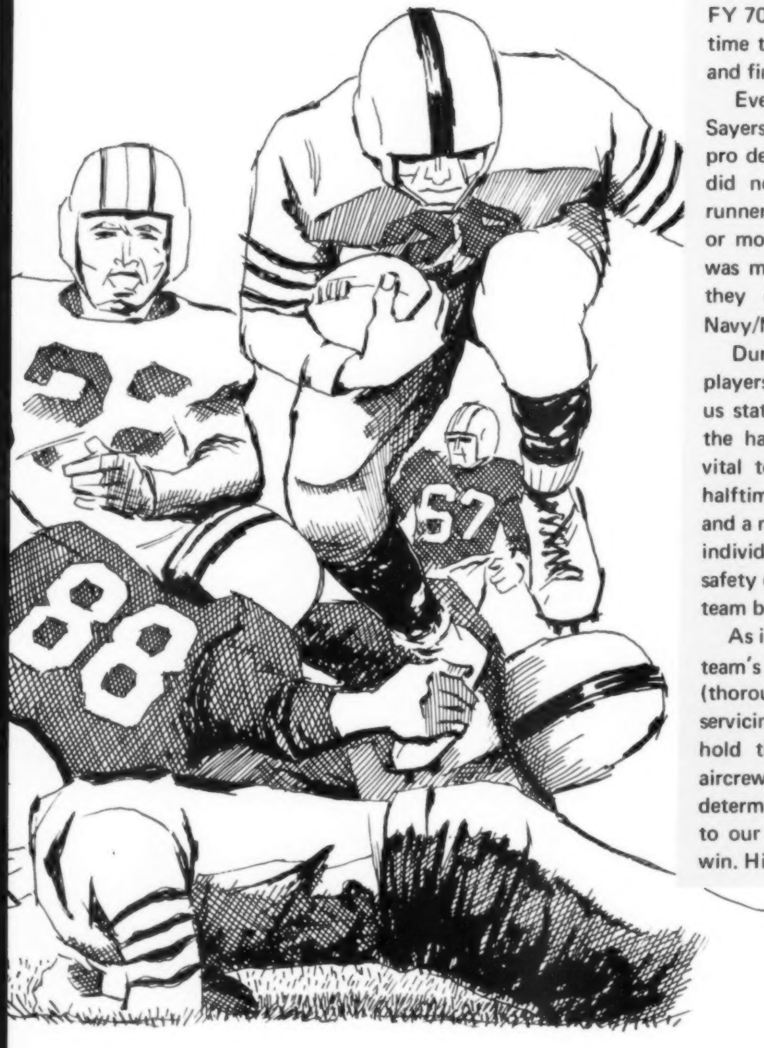
When he reached easy communications range from the ship the section leader transmitted, "Wheeze Control this is Chopper 54, flight of three, 270 degree radial, 25, over." After the ship acknowledged his call he continued, "The weather in my area is sold IFR and it appears the ship is heading into a line of thunderstorms. Recommend a general recall." The pilot was told, "Roger. Wait, Out." After about five minutes, with no further reply, the section leader, who was concerned about the safety of his flight, asked for IFR separation. Instead, for reasons that aren't too clear, he was cleared to take his flight into the starboard delta pattern. Approximately 30 minutes later and after several more requests for some kind of traffic control, all of which were acknowledged by the ship with, "Roger. Wait, Out" the "Stoofs" returned. The helicopters were now tooling around at 200 feet, visibility was down to a mile or less, the odds for a midair were building rapidly and the weather continued to deteriorate.

Finally the "Stoofs" all got aboard safely and the helicopters were cleared for tacan/CCA approaches. At one-half mile on his tacan the helicopter section leader slowed to "creep" speed and at about one-fourth mile visually picked up the ship, made a slight flare and landed. The others in his section landed safely also.

Admiration abounds for the pilots of the "Stoofs" and particularly for the pilots of the helicopters. Under the most trying circumstances they proved what real pros can do when tested. However, such tests are unnecessary. CATCC must have a plan for such emergencies and be ready to act. Helicopters, just like fixed-wing aircraft, need positive IFR control when the weather turns to worms. As one helicopter pilot *who was there* said, "Sure we wear wings and we're called angels but our wings are on our chests, not our backs." ◄

This story stems from an Anymouse report and is recounted here to emphasize pre-emergency planning between air wings/air groups and parent carriers with respect to foul weather. – Ed.

Second Effort

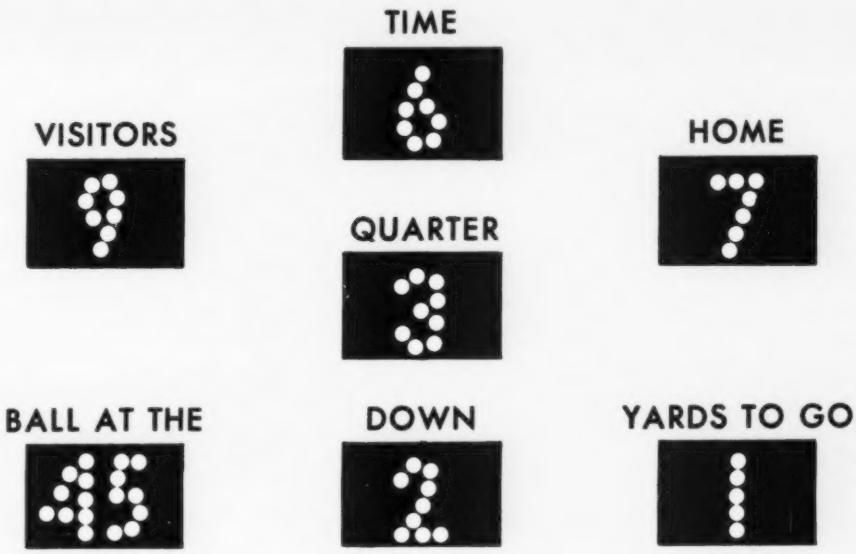


WE ARE well into the second half and we are behind in attempting to reach the overall Navy/Marine Corps goal of 1.0 major aircraft accidents per 10,000 hours in FY 70. However, we're not whipped yet and there is still time to rise to the occasion (with a strong second effort) and finish as a winner.

Everyone is familiar with the professional efforts of Sayers, Hill and Matte when they plunge into those big pro defensive lines. Most people would be remiss if they did not admit amazement at the many times these runners have turned "sure" losses into gains of five yards or more by refusing to give up when the first contact was made. An analogy can be drawn between the way they do it and what is now clearly necessary in Navy/Marine Corps aviation safety effort.

During the first quarter, despite having our team players charged up, repeated penalties and fumbles kept us statistically deep in our own territory. However, at the half the scoreboard shows that the momentum so vital to success has switched to the positive side. At halftime a spirit of optimism has begun to manifest itself and a new sense of confidence can be felt. (Attributed to individual and team effort, safety education material, safety council notes, Back-in-the-Saddle programs, safety team briefings by ComFAir staffs, etc.)

As in a professional football game where the opposing team's offense is stronger than expected, our defense (thorough maintenance, professional linecrews, expert servicing) must now put forth that vital extra effort to hold the line. Then, a fired up offense (pilots and aircrews following NATOPS procedures) can put forth a determined second effort and enable us to come closer to our goal of 1.0 in 70. There is still time enough to win. Hit that line – and CHARGE!



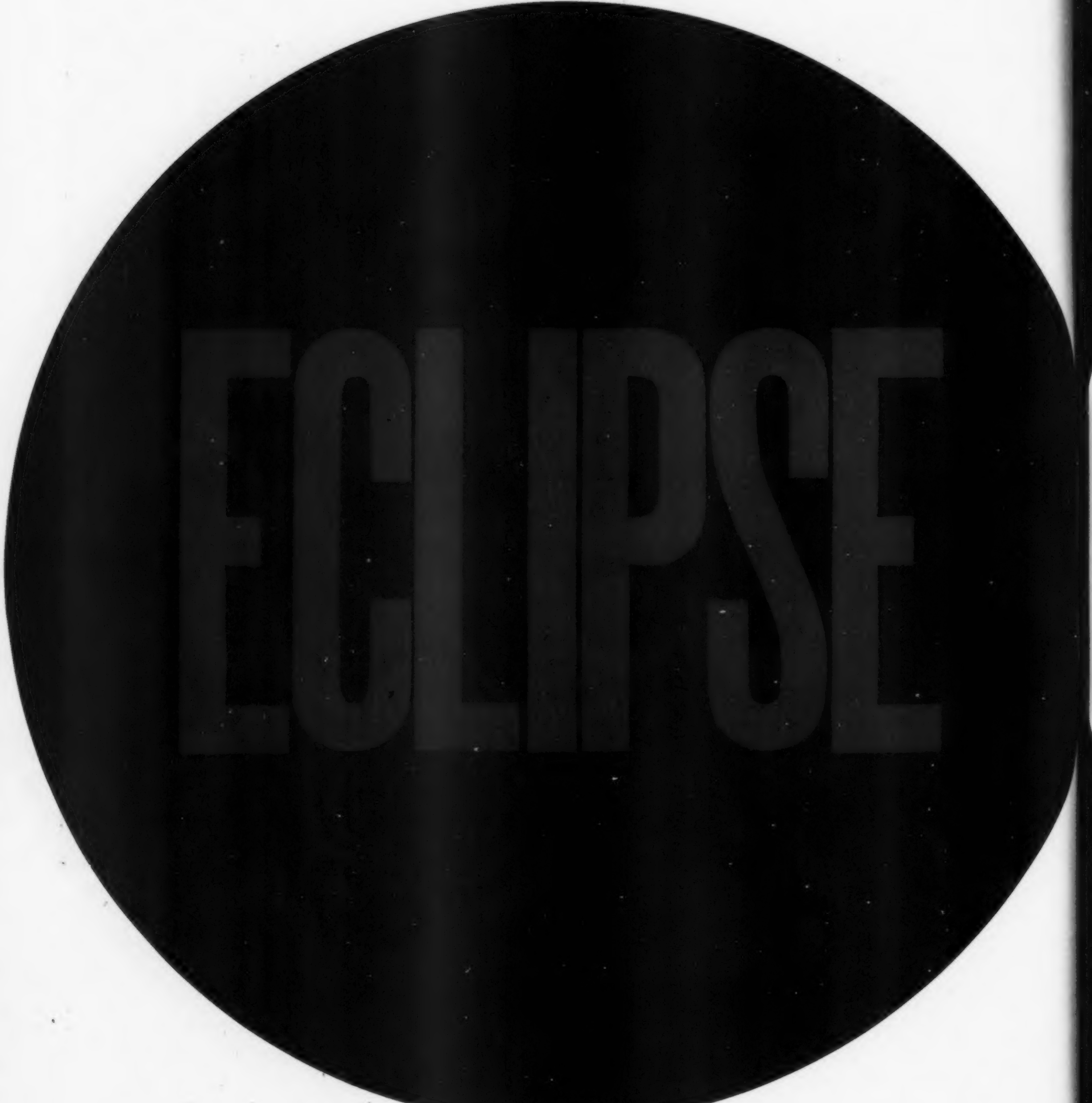
CUMULATIVE SCORE BY QUARTERS					
	1	2	3	4	GOAL
ALL NAVY RATE	1.48	1.31			
ACCIDENTS	129	214	?	?	1.0
HOURS (THOUSANDS)	874	*1628			

*Hours for November/December 1969 are estimated

The scoreboard tells the story!

At half-time (mid-fiscal year) the statistics displayed above represent a rate short of our goal. However, rates and statistics are not the important factors – losses of lives and equipment are. Hence the drive for a reduced accident rate. Ideally, we should target for a ZERO rate; realistically, we are striving for a reasonably attainable goal.

Portions of this article have been adapted from "An Eclipse of the Sun for North America" by Charles H. Smiley, Ladd Observatory, Brown University and first appeared in *Sky and Telescope,* Vol 35, No. 3, March 1968.



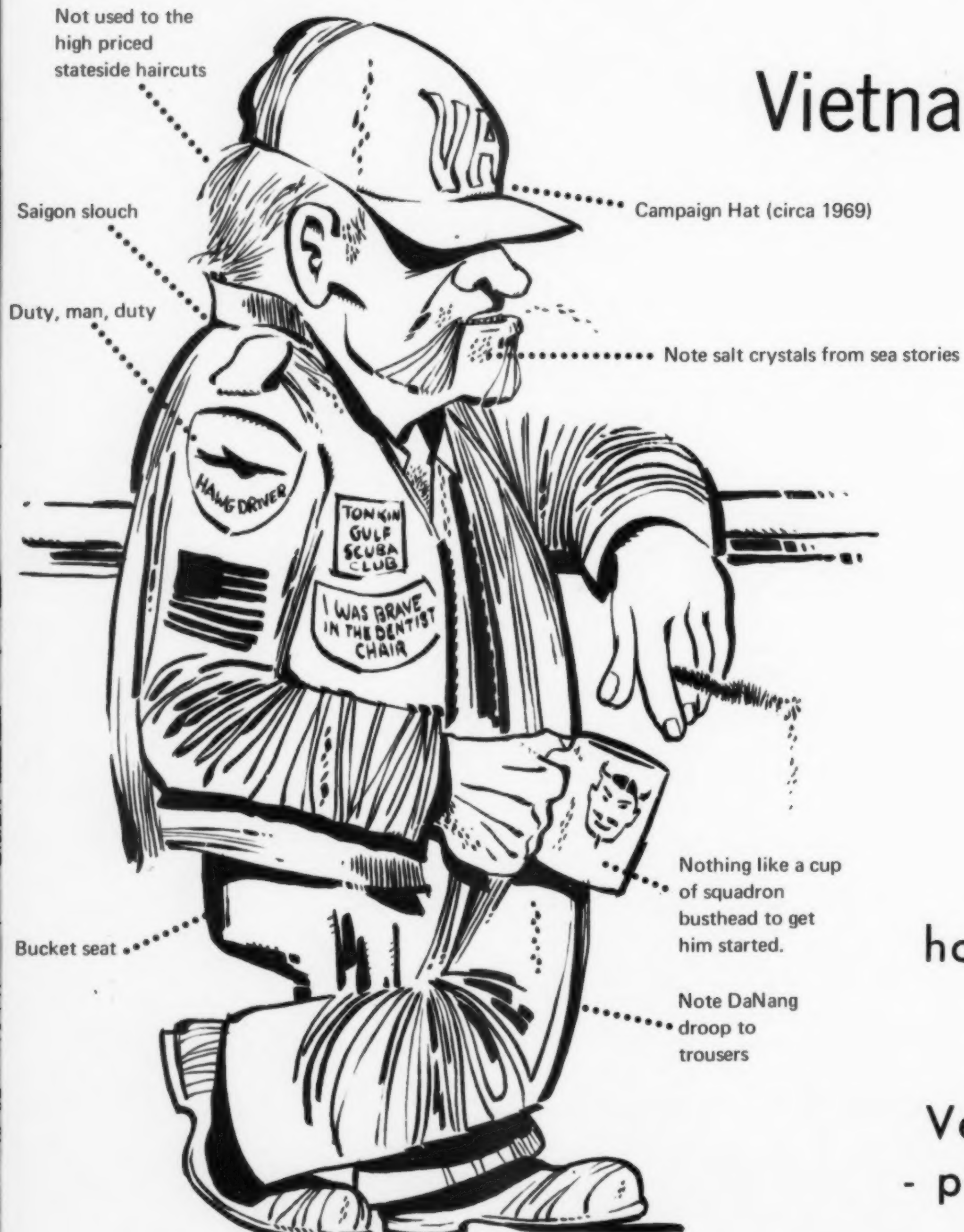
ON SATURDAY, 7 March 1970 a partial eclipse of the sun will be in evidence over most of North America as well as parts of Central America and the northwest corner of South America. Within this large area, a complete eclipse will be witnessed by millions of people along the eastern seaboard of the U.S. The path of total darkness will begin off the west coast of Central America, move into the Gulf of Mexico and curve northward across the area east of Pensacola and continue across Georgia, the Carolinas and cross the East Coast over Norfolk, thence over Nantucket and on past Nova Scotia and Newfoundland.

The umbra (shaded area) will last for a period of just over three hours. The moon's shadow will be traveling at about 1516 mph and will be approximately 80 miles wide. The maximum length of time of the total eclipse for a stationary observer will be between three and four minutes. However, an F-4, flying along the umbra could stay in complete darkness for about an hour, fuel permitting.

In the United States the shadow will first touch the Gulf Coast at Apalachicola about 1315 EST, then Savannah at 1324, Columbia/Charleston at 1327, Fayetteville/Camp Lejeune at 1330, Rocky Mount at 1333, Norfolk at 1336 and Nantucket at 1347. It will touch Canada at Halifax about 1445 AST, Sydney at 1458 and Newfoundland at 1532 NST.

Quite a few of our Naval Air Stations and Marine Corps Air Stations will be in the area of total darkness, as will be ships from the Virginia Capes area to the Narragansette Bay area. Many pilots, particularly Navy/Marine Air Reserve pilots on their drill weekend, may have the unusual experience of logging night takeoffs and landings in the middle of the day! Tower personnel should be alert to the necessity of turning on all runway, taxiway, approach and obstruction lights. Pilots also can expect that NOTAMS will probably be issued for those various sections of the East which will be particularly attractive to scientists and other observers.

The Care and Feeding of a Vietnam Vet



(or, how to get the salt out of a Vet's socks - painlessly)

THE RECENT Vietnam returnee is also a *transitioning* aircrewman (pilot, BN, RIO or EMCON). In this case, though, the Vet is likely to have a more far reaching effect on your unit than the average *transition* aircrewman.

Is the Vietnam Vet a successful tiger? You better believe it! He's alive and well and living in ConUS, isn't he?

He's in your unit to nurture the embryo tigers and help bring them to a high state of combat readiness. He's got some of the best experience in the world to draw on and he's just itching to unleash it for the betterment of all. So . . . let's use it but under controlled conditions so as to reap the greatest benefits.

Here's the gouge on how to extract the maximum benefit without dampening his spirit and enthusiasm:

• *Cardinal Rule.* Listen to all his sea stories with rapt attention being careful to maintain proper separation between upper and lower lips. This may cause an occasional flying insect to bother you but the knowledge gained is well worth the slight risk of incurring an incurable disease.

• When administering a NATOPS closed book exam, hint strongly that he is being considered for "Instructor" duty in the unit. Be certain to grade all his exam papers in strict privacy and be ready to acknowledge that any mistakes were probably caused by battle fatigue and/or his over-sexed condition. Reschedule the closed book exam for a period not earlier than one week later.

• Make the pointed remark (on a recurring basis) that everyone you know received decorations for heroism for combat missions much less demanding than those which he has recounted. Be prepared (on a recurring basis) to apply the *Cardinal Rule.*

• When you are stuck with a hard-to-fill NAMTG (Naval Air Maintenance Training Group) quota, gently break the news that he is the logical choice to "go down there and really show the other drivers what the airplane is all about." Emphasize the prestige which the squadron will gain by his participation in what some lesser individuals might consider a boring assignment. Be prepared at any time to repeat the *Cardinal Rule.*

• Keep his work area very warm and slightly damp so he will be comforted by a familiar environment.

• Periodically ask to see his battle scars. If he has none, casually bring up the subject of rocket attacks. Be prepared to repeat the *Cardinal Rule.*

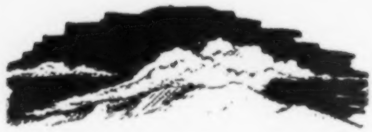
• As 1730 on Friday approaches casually drop the warning that "mild" social drinking overseas may be considered by some uninitiated stateside folks as acute alcoholism.

• On Monday morning, loan him lunch money and sympathize (profusely) when he complains of the high cost of stateside cigarettes, booze, dinners, gasoline, laundry and haircuts.

• Never playfully feed paper into a fan and holler "Ground fire!" when he is in the vicinity.

The Payoff: Aggressively announce to your nuggets (in his presence) that you do not tolerate expedients, shortcuts and lack of professionalism. Point to him with pride and say, "He is living proof of the benefits of a sound standardization program." Then stand back, and prepare to help him pick up his ribbons, wings and shirt buttons after he comments in a booming authoritative roar, calculated to raise the hackles on *any* tiger.

Contributed by MAJ R. J. McGan USMC, MAG-33 NATOPS Coordinator who credits an article in the 2nd MAW "Hot Dope Sheet" for his inspiration.



Pitot-Static Instruments:

ACCURATE (most of the time)

IN THE article on mountain flying in the January 1970 issue, an example was cited relating the experiences of a large transport which was caught in the grip of a mountain wave and almost slammed into a mountainside by the large downdrafts. As indicated on page 7 of the issue, by the editor's comment, an article follows on the inherent characteristics of pitot-static systems. A repeat of some of the events is being made to discuss these instruments on which pilots depend.

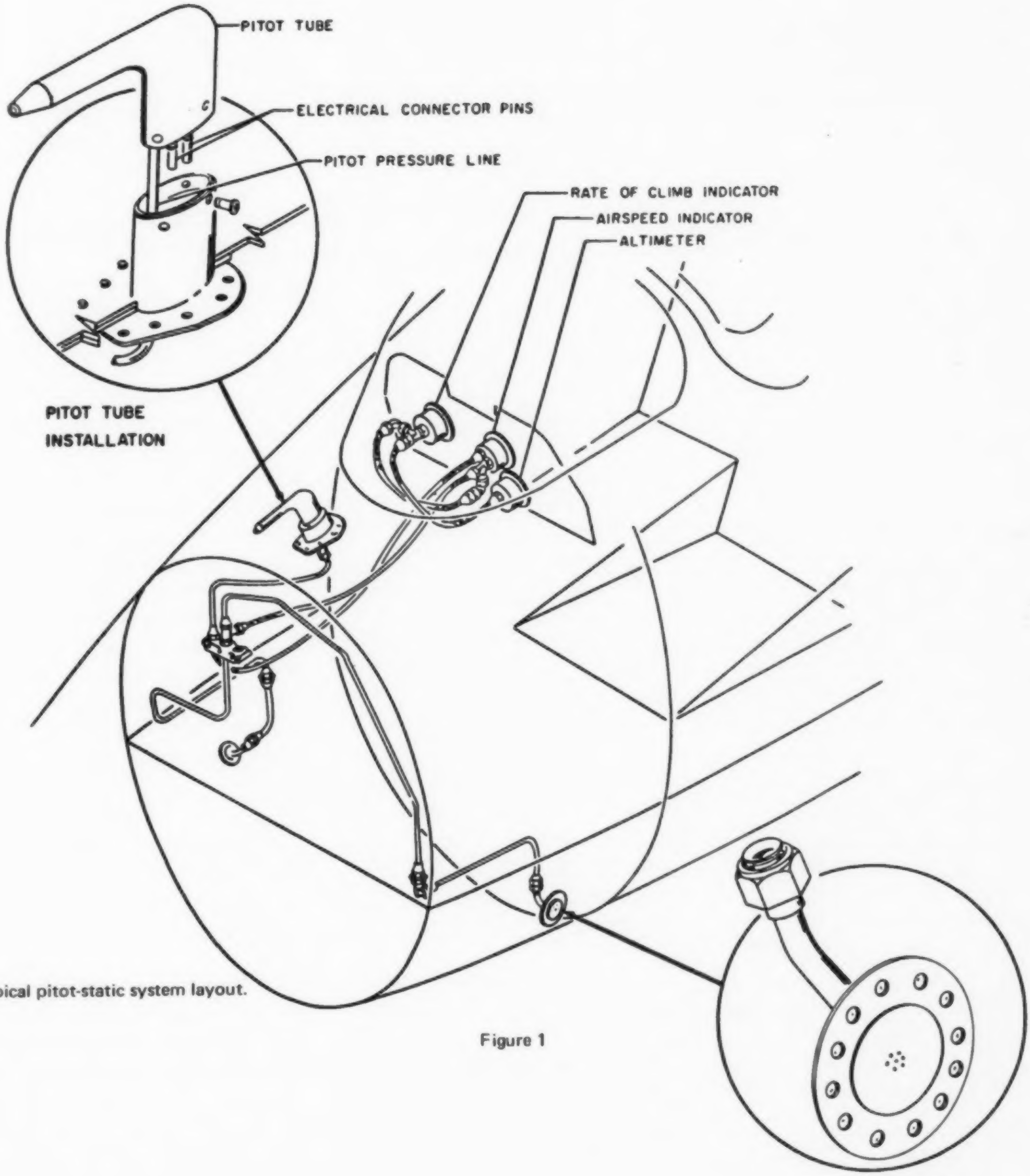
The aircraft was westbound from an airport in the eastern Mediterranean. A mountain range with the highest peak about 7800 feet had to be crossed soon after takeoff. The pilot was cleared and climbed to 10,000 feet before crossing the mountains. As the aircraft approached the ridgeline it began to descend at 2500 fpm despite full power being placed on all four engines. The descent stopped at 8000 feet, according to the altimeter, and the aircraft (having fortunately crossed the ridgeline by then) entered strong updrafts and climbed back to 10,000 feet in about 30 seconds – even though the pilot reduced throttles to descent power.

Every airplane flying today has a pitot-static system installed. Basically, this system consists of a pitot-static tube, one or more static vents and three indicators (airspeed, rate of climb and altimeter) connected by pneumatic tubing. Fig. 1 is a sketch of the system in the A-4 and illustrates a simple pitot-static system. The altimeter and vertical speed indicator need only static pressure whereas the airspeed indicator needs both static and pitot pressure. Under stable atmospheric conditions this system is still the most desirable that has been devised to provide accurate indications in the three vital areas of flight control; airspeed, rate of climb and altitude. Yet, there can be unusual circumstances during which total dependence on the accuracy of the system is unwise.

Flight Conditions

When the aircraft climbs, outside air pressure starts to decrease. This is sensed by the diaphragms and the instrument gages reflect an increase in altitude and a positive rate of climb. The opposite applies if the aircraft starts a descent. In each of the three instruments rapid changes in pressure can cause instrument lag. Let's assume that these flight instruments are installed correctly, have not been damaged in any way, that lines and vents are clear (see August 1969 APPROACH, Aircraft Pitot-Static Systems Problems) and the instruments are properly calibrated. Lag then becomes the one condition which causes incorrect readings. In any stable air mass, under optimum conditions, zoom climbs and rapid descents are too much for the system to absorb instantly. The aircraft instrument diaphragms cannot sense and register existing pressure changes instantaneously. It is no wonder then that under the worst conditions, in unstable air masses and turbulence, that the instruments are frequently inaccurate for considerable periods of time. When a pilot is caught in the downdrafts of a mountain wave (or a big cumulous or cumulonimbus cloud) the changes in pressure are frequently so rapid that he actually can be 1000 feet lower than the altimeter indicates. Conversely, if a pilot is on the upwind side of a mountain ridge riding a strong updraft his instruments sense a decrease in pressure but the aircraft may be hundreds of feet higher than the altimeter indicates.

For these reasons APPROACH wishes to remind pilots that when flying in mountainous areas at lower altitudes, *when large pressure changes occur*, rate-of-climb and



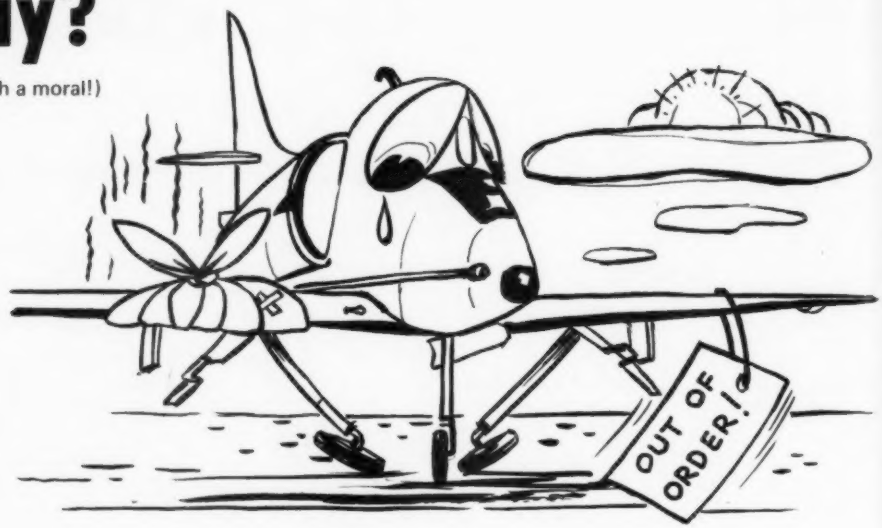
Typical pitot-static system layout.

Figure 1

altimeter gages frequently are not reliable. In mountainous areas, fixed wing aircraft pilots should allow plenty of altitude above ground level to provide a good margin for error.

A Play?

(Slapstick *drama* with a moral!)



Act I

Scene I – In the Skipper's Office.

"Hi, Skipper, you call for me?"

"Yes, Ace. It looks like we are going to need a safety type for our AdMat. How does that strike you?"

"Neat! I was sort of looking around for a piece-of-cake job. Does this mean that I get rid of some of those other lousy duties?"

"Nope. We'll just cover them up until after the AdMat. In the meantime forget about Safety School. The Navy can't advance us the funds. Not justifiable . . . or something like that."

"Rog, Skipper."

Act II

Scene I – Still in the Skipper's Office.

Bang! Crunch! Bonk! (noise in the background).

"What the blazes was that?"

"Beats me."

"Hey, Safety! Ops here . . . Are you in the Skipper's office? Maintenance says that a ladder just fell off of OO. Says it beat up a couple of fairings and a slat, whatever they are."

"Rog, Ops. Safety here . . . We can fix it ourselves. On second thought, how about us calling NARF and getting a super job done?"

Skipper cuts in: "Sounds good, but don't get too involved. You know how I hate paperwork."

Act III

Scene I – Out on the Flight Line (nestled between the hangar and a ready service locker).

"What kind of P&E type are you? 1200 hours to fix this?"

"Well, son, you know how it is. I've got two brothers and a sister on the day shift. We gotta eat, too!"

"Yeah, well, this makes it an accident. Rocket One isn't going to be happy."

"You could always transfer the airplane, you know."

'We tried that, but no joy. Thanks anyway."

Act IV

Scene I – (15 days later) Next Safety Council Meeting.

"As your ASO, I can report that we got that mess out in time. I'd like to add, it was a lot of paperwork, to point out the obvious. Am I right, Admin?"

"No kidding, ASO. I figured out how many hours we all worked on this. Seems like Doc Worms' spent four hours interviewing and writing

ANYMOUSE

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

the MOR of the pilot who was preflighting the aircraft. Our corpsman spent an hour typing the report and it took the driver one-half hour to deliver it. I then figured out how long it took the Board to complete the required blanks (no one around here's been to safety school so they're not too swift at these things). All told, I figure that about 380 hours of writing, typing and fiddling with the stencil machine went into this."

"Great balls of fire! The Boss will wring his palm tree. How come everyone screams safety but no one cares if anyone has been to safety school before coming to the squadron?"

(Deep Silence).

Moral: Plan ahead and request that a safety school graduate be among your next group of replacement pilots. If this cannot be done, investigate the possibility of getting a quota for the five day ASO safety orientation course given periodically by NavSafeCen. Quotas should be requested through the appropriate fleet air commander.

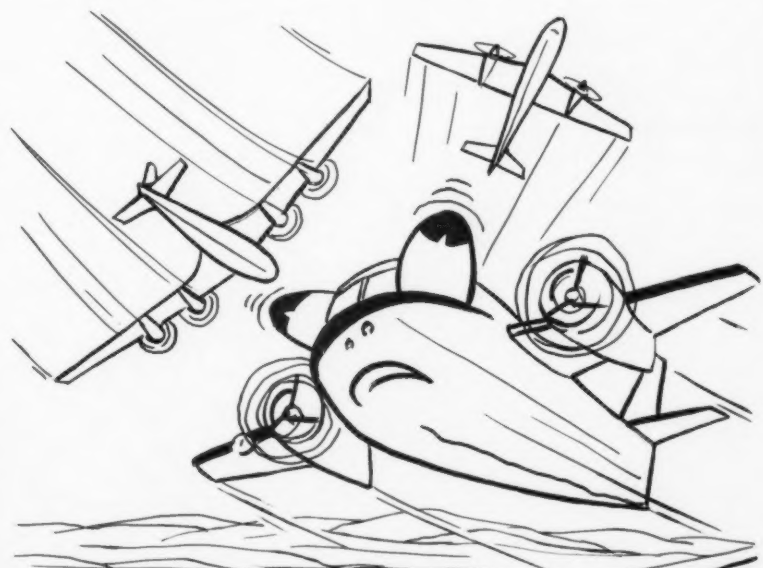
Near Mid-Air Collision

THE WEATHER was VFR with haze, visibility two miles. We were on a radar departure from Andrews AFB and had been given a clearance to climb to 3000 feet on a heading direct to Nottingham vortac. As we continued our climb from 800 feet I noticed a civilian Aero Commander at our 1130 position at 3000 feet (approximately). He was slightly ahead of us gradually angling to the right across our course. I pointed the plane out to my copilot and told him to keep an eye on it. A few seconds later radar told us that we had traffic at 12 o'clock, three miles. We both looked ahead and saw a C-54 at our same altitude heading toward us. We were concerned with this situation and as we watched he approached us, then made a left turn. Just as I had ascertained that we would clear him safely, my copilot said that we had the Aero Commander above us. At that point I looked up to see him 500 feet directly above and slightly behind our nose. We were passing 1500 feet, climbing, and he appeared to be leveled off. I immediately lowered the nose and reduced power as my copilot informed the radar controller. The Aero Commander then turned to the right and when he was well clear of us we resumed our climb.

This situation reinforces the necessity of keeping a visual lookout when under radar control in a VFR area. If we hadn't been preoccupied with the reported traffic ahead of us, we might have avoided the near collision; on the other hand, if I hadn't told my copilot to watch him at a time when he seemed well above us and clearing our course we might have climbed into him. His position at the time of the near miss was such that we could only see him by looking directly up through the overhead hatch.

CRTmouse

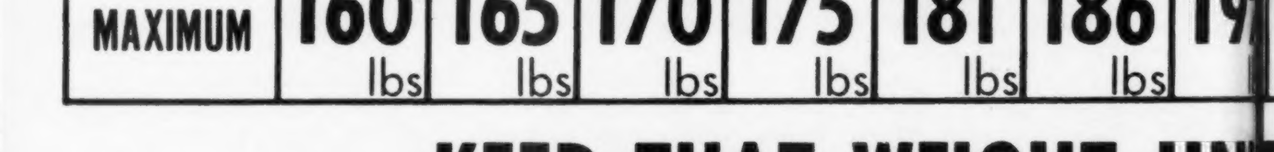
Unless things have changed in the Washington Metropolitan area there shouldn't have been any VFR traffic with a flight visibility of only two miles. However, the fact that both of you had your heads on a swivel probably reduced a mid-air to a near miss. (Good on 'ya.) In the recently released FAA NMAC (Near Mid-Air Collision) report Washington was one of seven high density terminal areas listed where more than 25 NMACs (classified as hazardous) were reported during 1968 and conservative estimates indicate that for every reported NMAC there are three or four unreported ones. Your report also brings up another point. Just as a good pilot keeps up a continuous scan of all instruments when on the gages it is equally important in high density areas to not fix your scan on one sector where traffic has been reported but keep those orbs on the lookout for unreported traffic in other sectors too.



ARE YOU: a. HEAV b. TOO

HEIGHT	64"	65"	66"	67"	68"	69"	70
MINIMUM	105 lbs	106 lbs	107 lbs	111 lbs	115 lbs	119 lbs	12
MAXIMUM	160 lbs	165 lbs	170 lbs	175 lbs	181 lbs	186 lbs	19

KEEP THAT WEIGHT UN



Suggested minimum and maximum weight limits for Navy and Marine Corps Aviation personnel as related to height. *Manual of the Medical Department (NavMed P-117).*

EAVY ENOUGH TO FLY?
OO HEAVY

70	71"	72"	73"	74"	75"	76"	77"	78"
12[illegible]	127 lbs	131 lbs	135 lbs	139 lbs	143 lbs	147 lbs	151 lbs	153 lbs
19[illegible]	197 lbs	203 lbs	209 lbs	214 lbs	219 lbs	225 lbs	230 lbs	235 lbs

UNDER CONTROL! KEEP FIT!

FATIGUE

MOST of us have experienced at least one night in which sleep never came and we spent the hours lying in bed, staring into the darkness and waiting for daybreak. Just such a night contributed to a pilot factor accident in which an RA-5C landed hard aboard a carrier. Pilot fatigue plus a malfunctioning Optical Landing System set the stage.

For no particular reason that the pilot could recall, he did not sleep at all the night before. The preceding day had been pleasant. It was a Sunday and after breakfast he had gone ashore sightseeing and taking pictures as he walked through the Caribbean town. Around noon he went to the beach for a swim and later had dinner in a restaurant. He returned to the ship about 1530 and took a one-hour nap. After dinner, he went to the movie in the ready room and about 2200, turned in. He found that he couldn't drop off to sleep so he read until midnight, then gave it another try. At 0100 he was still wide awake so he read for another hour. Still unable to go to sleep, he lay in his bunk until 0700, at which time the ship got under way and commenced preparations for the conduct of air operations.

After breakfast he stopped by sick bay to get some sunburn ointment for his legs and ankles. (Perhaps discomfort from sunburn was a factor in preventing sleep the preceding night.) At 0930 he briefed and at 1110 he and his RAN took off on a mapping mission. He returned in midafternoon, ate lunch and took off on a second hop. It was at the end of this hop at 1651 that the accident occurred. Except for his one-hour nap the day before the pilot had been without sleep for 32 hours. He later described the mapping mission as "fatiguing" and said that he was "bored and tired" during the second flight, a routine overwater navigation flight until the last 20 minutes. At this time he flew wingman and his bored, tired feeling disappeared.

Fatigue Disrupts

The investigating flight surgeon was of the opinion that the pilot's lack of sleep, followed by a heavy flight schedule combined with the possible malfunctioning fresnel lens system, "makes it very likely that the pilot was responding with less than optimal efficiency while bringing his RA-5C aboard ship."

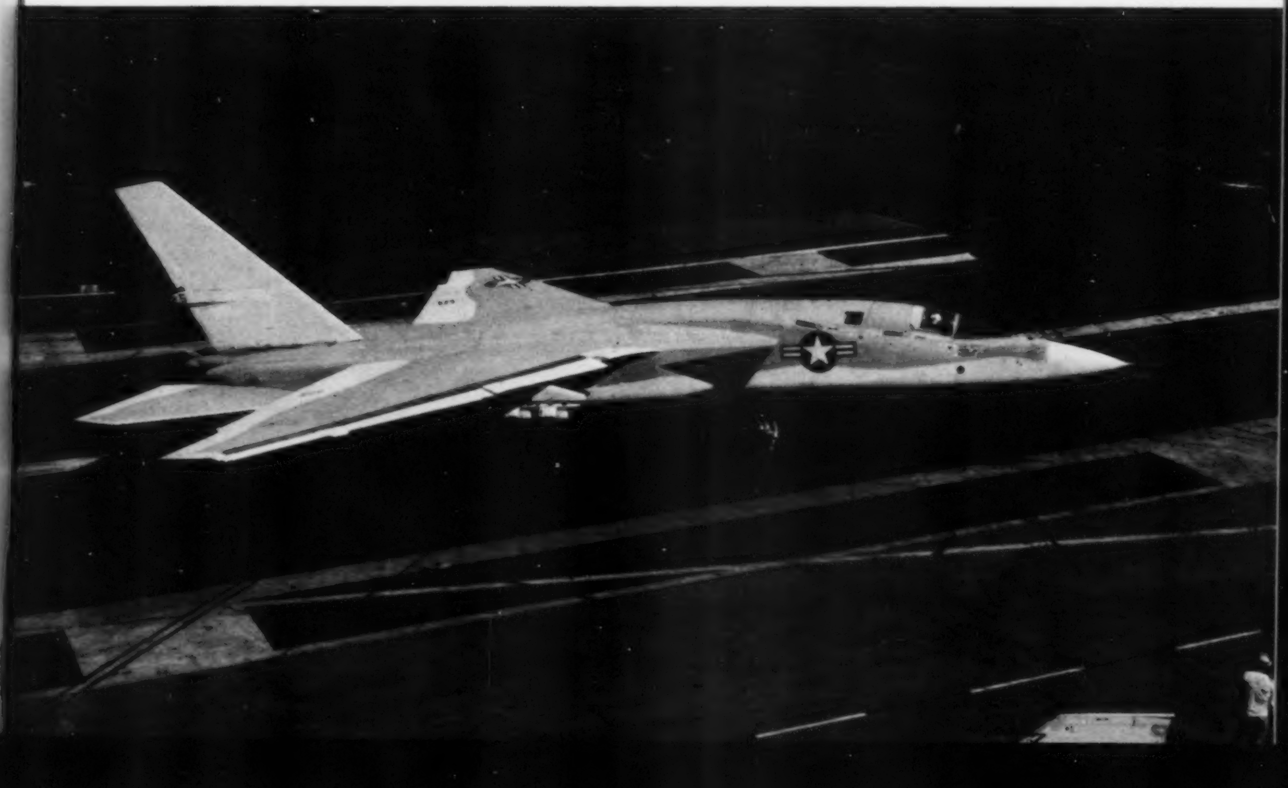
"The fact that fatigue can cause more than 'minimal loss of efficiency' is well documented," the flight surgeon states. "Early fatigue can cause disruption of sequential timing and at a later stage can cause a disruption of the perceptual field and a centralization of attention. Accuracy and smoothness of control movements are lost at this stage and there is a tendency to overcontrol or undercontrol one's movements. It is usually very late when an individual can subjectively perceive this deterioration of performance.

"It is obvious from a review of the pilot's three-day autobiography," the flight surgeon continues, "that he must have been experiencing at least a moderate amount of fatigue. After 30 hours of continually being awake, the average individual will show the objective if not the subjective signs of fatigue. I am sure that the four hours in the air during the first hop served to aggravate this situation."

Lands Hard

At one-half mile the pilot called a "high ball" after calling "Clara" twice at the beginning of the approach. He states that he was trying to fly a high ball but that in close "the ball started to go down." He attempted to catch it with attitude about the same time the controlling LSO called for "attitude." The rotation continued and a hard landing resulted.

At this time other pilots were reporting the ball to be dim and its movement to be rapid off the top of the lens prior to their crossing the ramp. The RA-5C pilots noted that they were forced to fly a high ball because maintaining a center ball on glide slope usually evoked a "low call from the LSO." No statement from the technical representative sent to study the malfunction



was available at the time of the investigation report so the board could only deal in probabilities on the question of malfunction of the Optical Landing System.

Fatigue Factor

The investigation report also addressed the fatigue factor. No evidence was found to indicate that the pilot appeared tired or uneasy on the day of the accident. This being the case, there was no apparent reason for supervisory personnel to either cancel the flight or switch crews, the board noted. In this sense, investigators felt that the pilot erred in not making his feelings known to proper authority. They did, however, recognize mitigating factors in the situation.

"Today's carrier pilot is conditioned to accept something less than optimum operating conditions a considerable part of the time," the final report states. "The pressure of operations, the training to be accomplished and the pilot's desire to get the job done, in conjunction with the well-publicized desires of his superiors right up the chain of command . . . tend to have a pilot opt for the mission rather than ask to be excused from it because he is tired. In short, the dangers of fatigue are usually mentioned only in briefings by flight surgeons or, unfortunately, after the fact, as in this case. The gap that exists in the aviation safety program in this area will be eliminated only when superiors recognize the point at which the tempo of operations must be scaled down and, for their part, *when pilots are willing to admit to conditions that preclude safe flight.*"

Recommendations

The board recommended that "supervisory personnel *and* pilots reassess the dangers of fatigue and, in the same light, give maximum attention to the compatibility of operational commitments and pilot utilization in the interests of aviation safety."

Concurring in this recommendation, the squadron C.O. stated that fitness of flying personnel (Section 820 of OpNavInst 3710.7D CH-3 General NATOPS) will be emphasized on a continuing basis to all aircrewmen in the squadron. The C.O. considered the pilot's lack of sleep for 32 hours prior to the accident as a contributing cause factor. He also addressed the pilot's failure to report his fatigue before the flight.

"The fitness of flying personnel bears a two-way responsibility," the C.O. wrote. "The individual pilot is responsible for maintaining his mental and physical fitness at peak levels and for the prompt reporting of any lowering of his fitness to his commanding officer. Commanding officers should give their full support to an unbiased and healthy attitude toward grounding of

SLEEP

OPNAVINST 3710.7D CH-3 to General NATOPS discusses various factors which affect the physical states of aircrews. These factors must be understood by all concerned, the instruction states, and appropriate countermeasures must be taken to assure that they do not depreciate aircrew fitness prior to or during flying and that individuals, if so affected, are temporarily grounded until again fit to fly.

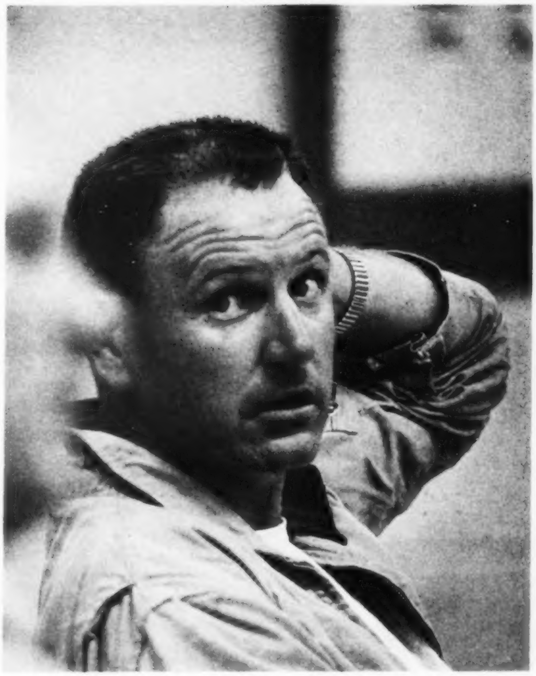
"*Rest and Sleep*. Eight hours of sleep is the generally accepted requirement in every 24-hour period. Flight personnel should not normally be scheduled for continuous alert and/or flight duty (required to be awake) for an excess of 18 *hours* . . . Flight schedules should be made with due consideration for watch-standing, collateral duties, training and off-duty activities.

"*Flying time*: Precise delineation of aircrew flight time limitations is impractical in view of the varied conditions encountered in flight operations.

flying personnel in the interest of safety. The pilot's 'after the fact' revelation to the flight surgeon that he was tired should have been mentioned to the proper authority prior to launch. The tempo of flight operations during this at-sea refresher training period had not been demanding and a replacement pilot could have been easily substituted."

Fatigue is not a subject which lends itself to easy solutions and pat formulas "for the prevention of." In fact, so many are the variables that no one has really arrived at a completely satisfactory scientific definition of the term. (In the context of aviation "operational fatigue" is one term used to describe the combined detrimental effects of muscular exertion, anxiety and boredom on the performance of aircrews.) One of the demonstrated facts about the elusive subject of fatigue is that as fatigue increases, performance deteriorates. Tired pilots accept poor performance because they *do not realize* that their performance is slipping. Errors appear, continuity of performance is lost and peripheral information is ignored.

Even taking into consideration the advantage of hindsight in particular cases, certain points can be made. It would seem that in this instance the pilot could have reported his fatigue and lack of sleep to good purpose.



Required pre and post-flight crew duty time must be given due consideration. The following guidelines are provided to assist commanding officers in ensuring that flying safety is maximized consistent with operational efficiency.

"1. *Daily* flying should not normally exceed two flights or six and one-half hours pilot time for pilots of single-piloted aircraft. Individual flying time for pilots of other aircraft should not normally exceed three flights or 12 hours. These limitations assume an average requirement of 4 hours ground time for briefing and debriefing.

"2. *Weekly* maximum pilot time for pilots of single-piloted aircraft should not normally exceed 30 hours. Total individual flying time for each aviator of other (type) aircraft should not exceed 50 hours. When practicable, aircrews should not be assigned flight duties on more than 6 consecutive days.

"3. *Accumulated* individual flying time should not exceed the number of hours indicated in the following table:

Period (Days)	Single-piloted aircraft (Hours)	Multi-piloted non-pressurized aircraft (Hours)	Multi-piloted pressurized aircraft (Hours)
30	90	125	150
90	240	330	400
365	850	1200	1400

"4. When the tempo of operations requires that the flying time limitations delineated in 3 (above) be exceeded, aviators should be monitored and specifically cleared by their commanding officers, on the advice of flight surgeons. Commanding officers should assure equitable distribution of flying time commitments among assigned aviators, commensurate with such additional ground duties that each may be assigned."

OpNavInst 3710.7D, CH-3

notes from your flight surgeon

Disastrous Diet

THE STRESS of a deliberately inadequate diet is suspected in a fatal accident involving pilot factor during the landing approach following night dive bombing in marginal weather.

"Caribbean weather is very hot and muggy and everyone notices the fluid loss and fatigue," the investigating flight surgeon writes. "In addition, all members of the detachment knew that LTJG 'X' was trying to lose weight and that he was deliberately skipping meals during the entire stay in Puerto Rico."

The flight surgeon's summary discussion of this is well worth consideration:

"How many times can we all remember saying and hearing others say how boring and useless flight surgeons' lectures on personal care are?" he begins. "I've heard this from flight surgeons as well as naval aviators and I must admit that while presenting these topics to any but the newest of aviators, I sometimes feel I'm insulting their intelligence by discussing such basics as adequate rest, proper diet, fluid intake and the like. But now there has been an accident – a fatal one, unfortunately – a contributing factor to which is not only mental fatigue and stress but also the stresses of a deliberately inadequate diet.

"The exact role of these factors will never be known, of course, but it clearly points out the continuing need for their repeated reemphasis to all aviators on a regular basis. The can-do tiger attitude which we all look for in aviators is cultivated and strongly desired and that had better never change. But the aviator's ideals must be tempered with a clear realization of the importance of his own personal health and hygiene and his physical and mental limitations.

"This responsibility falls upon the flight surgeon, of course, but the example and direction of senior aviators must also be relied upon . . . "

The first endorser to the investigation report discussed the all-too-human tendency to apply rules to everyone but yourself:

"The aeromedical aspects of aviation (the effects of heavy dieting, stress, mental/physical fatigue, etc.) are currently a part of the syllabus of the replacement pilots in this squadron. The more difficult part of this problem is to get each pilot to view the cautions as something directly applicable to him rather than to 'other pilots.' Observations and discussions indicate that many aviators diet at various times and in many diverse ways but the dieters generally believe that their dieting practices do not detract from their performance although they recognize that others may be affected by spartan and unsound dieting."

Air crew fitness is as important as aircraft fitness. All reducing diets must be under the strict supervison of the flight surgeon.

Two-Piece Nomex Flight Suit

QUITE a few people who have heard about the two-piece nomex flight suit developed for the Army have asked if it is an acceptable substitute for the Navy's one-piece coverall design. The answer is no.

The two-piece suit was recently evaluated by Fleet Marine Force, Pacific for use by FMF helicopter flight crews. The result of this evaluation was discussed at a recent CNO/Naval Air Systems Command-sponsored conference on aviation life support equipment. It was decided that the suit was unacceptable and had no basic advantage over the one-piece design. One of the prime disadvantages of the two-piece outfit is possible inadvertent separation of the two pieces at a critical moment, resulting in far more serious burn injuries.

The one-piece nomex summer flight suit is definitely the best flight suit available at this time. Flying personnel should be discouraged from obtaining and wearing the two-piece flight suit. Why settle for less than the best?

Big Splash

HERE'S a note from a flight surgeon sent us by LT Stephen S. Arendale, flight surgeon at NAS Corpus Christi. Besides the fact that we subscribe to the theory that chuckles are good for your health it has a safety message.

One night not too long ago a pilot was preparing to take two students out for a night hop in a TS-2A. The instructor told the students to preflight the topside of the aircraft, which was parked on the seawall near a hangar, and he would preflight the lower portion. As the instructor was checking the port wing he walked off the seawall into the bay.

The students finished their job and looked for the instructor but he was nowhere to be found. Minutes later they heard a faint

"Help!" and quickly spotted the instructor treading water in the 5 1/2 to 6 foot deep part of the bay. He was rescued uninjured but *extremely* redfaced.

"This is a rather humorous ending to what could have been a disaster," Dr. Arendale writes. "The instructor was wearing no survival equipment at the time. After all, how often do you get into a survival situation during a preflight? The incident can be attributed to a combination of darkness, unfamiliarity with the area and departure from normal procedures in that aircraft are usually parked well away from the seawall."

Survival Equipment

HERE are some recent developments in protective clothing for pilots and aircrew from an article by Lionel I. Weinstock of the Crew Systems Division, Naval Air Systems Command in the *Naval Air Technical Journal,* Vol. 3, No. 3:

Winter flying suits (jacket and trousers), MIL-S-18342: Advanced development of an improved winter flight suit is complete. An all-nomex suit will replace the current suit which has a nylon outer shell, knitted polyester insulation and fire-retardant-treated cotton lining. The new suit will have a nomex-filament outer shell, nomex-quilted batting insulation and knitted nomex at the wrists and ankles. Fleet evaluation of prototypes will take place during this winter. Larger scale procurement of the final design will follow for introduction of the suit next winter. At that time the new suit will supersede the present winter flight suit on an attrition basis.

Anti-G suit, Mk-2A, MIL-C-23955: The present nylon cover fabric used to contain the bladder of the anti-G suit will be replaced with a nomex fabric. A revised specification will reflect material and design changes for future procurements. *(The Naval Air Development Center advises that the new anti-G suit will have velcro adjustment in place of laces, a pocket on each leg and no steel stays. Although the present design of the new suit incorporates a hard hose, the final design will have a soft hose, thank goodness! – Ed.)*

Anti-exposure suit: A new "cold-water-exposure protective assembly" has been developed using the skin diver's wet suit principle of insulation with the nomex flight suit as an overgarment. The nomex coverall substantially improves fire-protection qualities over the present Mk-5A anti-exposure suit. The assembly is being evaluated by AirLant and AirPac HS and VS squadrons and in a limited number, by VA and VF squadrons.

Helmet Goes

DURING parachute descent after his ejection, a pilot removed his oxygen mask and, as a result, his APH-7 helmet fell off. He had failed to tighten either the nape strap or the chin strap. His helmet fell some 800 feet into the water; however, it was retrieved by the pilot as soon as he was in his raft. The pilot then put it back on in order to avoid possible injury during helicopter hoist.

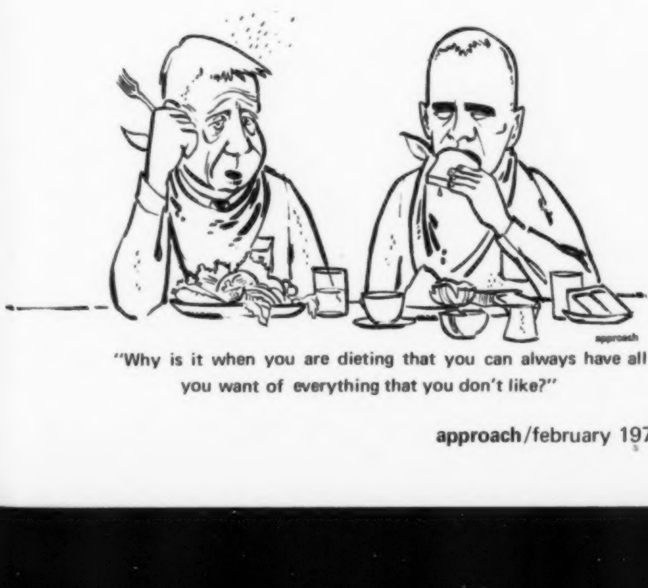
Secure those nape straps and chin straps, please!

Nomex No-No

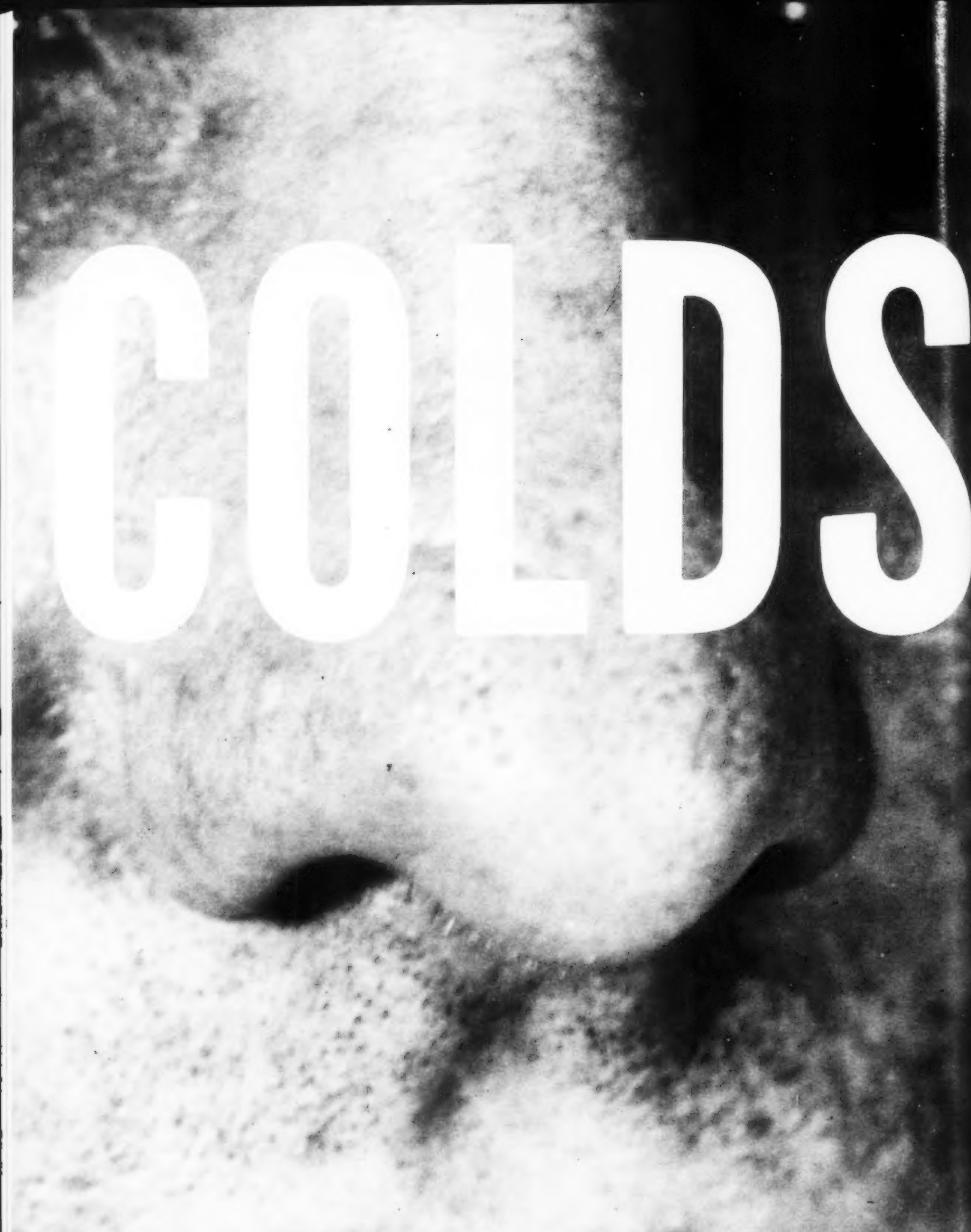
GUNNERS in some helicopter squadron detachments are cleaning their weapons while wearing their nomex flight suits, a flight surgeon reports. As a result the flight suit becomes saturated with grease and cleaning solvent solution. Needless to say, this does nothing for its fire protection qualities. Gunners doing this chore should be wearing their working uniforms with aprons. *Nomex flight suits are for flying only.*

Cracked Through

AFTER an aircrewman was rescued following a helicopter crash, he discovered that his APH-6 helmet had a "through and through" crack just above and behind the left ear region. The damage indicated that the helmet had absorbed a severe impact at that point, investigators reported. The helmet very likely protected the crewman from fatal head injury when the helo struck the water. ◄



"Why is it when you are dieting that you can always have all you want of everything that you don't like?"


COLDS

"AH-AH-AHH-AHHTCH-AHHTCH-SHEW!"

And so another multitude of cold viruses is launched and airborne a-looking-for-a-home.

The calendar says February (in other words winter) but in reality colds know no season. You can have the aching miseries and stopped-up nose in a steamy hooch in Nam or aboard ship in the Med in mid-summer just as well as in a New England BOQ in a winter snowstorm. In fact, one of the current theories on the subject is that people have more colds in the wintertime simply because they stay indoors more in crowded, overheated, poorly ventilated places and therefore encounter more viruses and germs.

Any way you look at it, cold viruses are around and chances are they are going to join up on some of us from time to time. A little old-fashioned courtesy and common sense to help prevent the spread of colds is in order: cover your mouth with a handkerchief or at least your hand when you cough or sneeze.

"Ah-Ah-Ahh-Ahhtch-Ahhtch-Shew!"

There goes our ailing friend again.

If he is going to spend his day at a desk in the squadron spaces, chances are he won't do much beyond giving his cold to everybody in the neighborhood. If he's still planning on going flying he can share his assorted viruses and germs with the rest of the crew or, if he's a single place type, maybe he can pass his cold on to a couple of people at operations and a ground crewman or two. But the main danger in his flying is to himself. He can beef up his simple head cold with a number of complications.

(Complications lead to grounding and grounding leads to loss of flight time. Inescapable conclusion: it may jolly well cost less in the long run if you stay on the ground in the first place and wait out your cold.)

Let's look at some of the possible developments that can occur when you start with a simple stuffed-up head.

Basic to the discussion is the fact that in your head you have eight holes.

We're not talking about your eyes, ears, nose and mouth – that's six, anyway – we're talking about your sinuses: two above your eyes, one on each side of your nose, two above your upper teeth and two behind your eyes.

Air comes and goes freely in your sinuses through small openings or canals *unless* something obstructs them. Air in your sinuses expands when you go to altitude. If your sinus canals are blocked for any reason (like a cold for instance) the air cannot escape when you descend and the result is pressure immediately followed by excruciating, radiating pain.

In the same way, swelling or mucus blockage of the eustachian tubes, which equalize the pressure in your middle ear, can cause a painful pressure differential. One of the most dangerous results of ear blocks for pilots and air crew is pressure vertigo.

The immediate consequences of a sinus block or an earblock in flight are pretty obvious. The long-term consequences are also worth considering. If your ears or sinuses stay blocked after you have made it safely back on deck normal drainage of these congested areas will not occur. This sets up a beautiful culture medium for bacteria. Then you are on your way to a full-blown case of infected sinuses or a middle ear infection known to the medics as aerotitis media. Both of these afflictions you can do without.

Along with the physical hazards of flying with a cold, the chemical hazards must be considered. A guy with a cold is very likely to be trying every pill and formula ever recommended to shorten his misery. Antibiotics, of course, will not touch the viruses of the common cold and you're wasting your time and money if you think they will. Most of the popular nostrums which people take to keep them on their feet when they have colds contain antihistamines. *Antihistamines are verboten for airborne fliers.* These drugs usually cause drowsiness and dizziness as well as a number of other physical reactions which have no place in the cockpit. Drowsiness can be a particular hazard because it is extremely difficult to recognize. So get your flight surgeon to brief you on the particular effects of specific over-the-counter and prescription remedies.

To date there is no guaranteed cure for the common cold, and nobody's come up with anything better than the old-fashioned advice as follows:

- Drink plenty of liquids and eat wisely and well.
- Get lots of sleep.
- Get plenty of exercise.
- Avoid people with colds.

Generally speaking, an ordinary uncomplicated cold will run its course in about a week. It just *seems* to take longer. If you have a cold, don't fly – not even if you're a triple centurion. Those few days on the ground are a small chunk of time to pay when compared with a broken aircraft or a lost life.

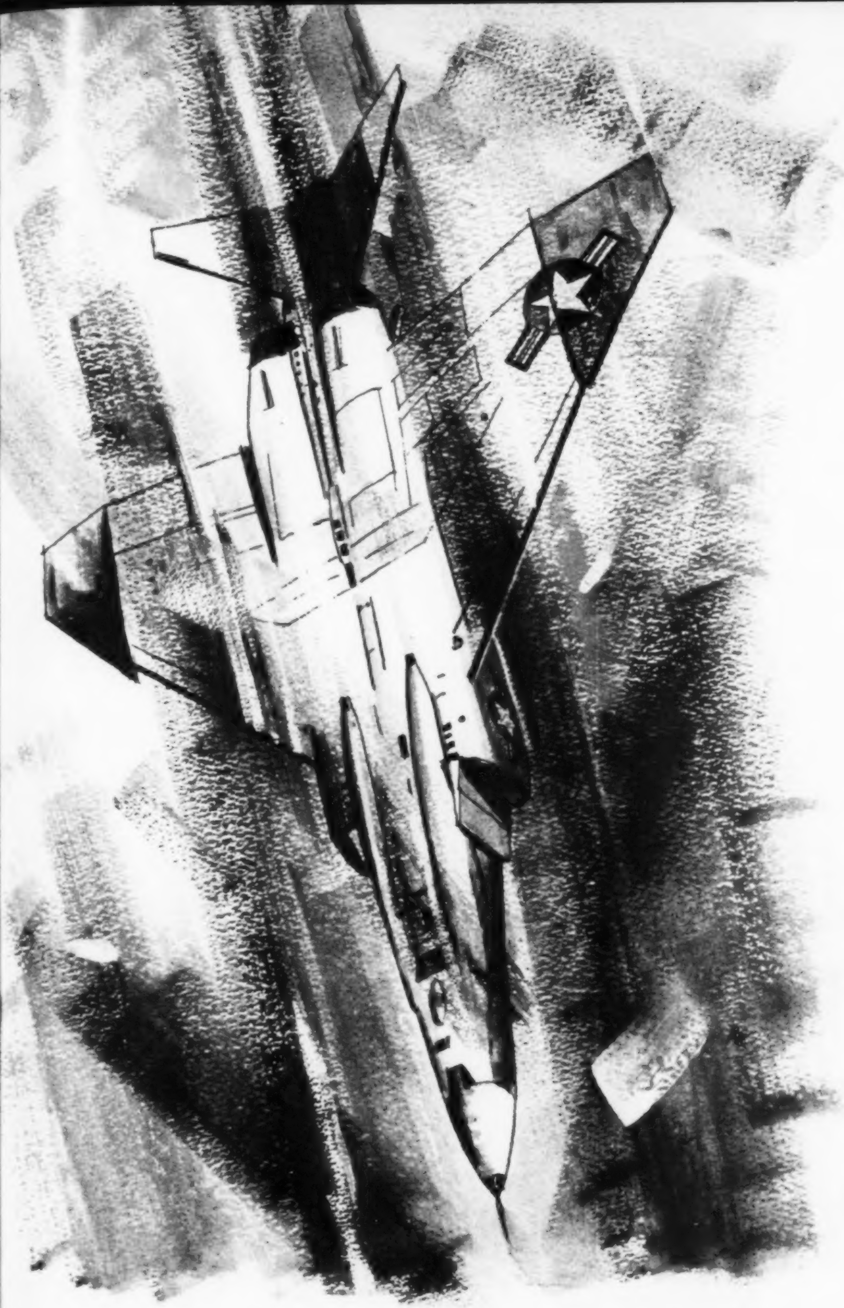
Foreword:

The USAF Twelfth Air Force Headquarters has recently published a report of the procedures used in the recovery of an RF-4C from out-of-control flight. The excellent information in this report pertaining to the positive recovery characteristics of the F-4 from uncontrolled flight when the drag chute is deployed early during uncontrolled flight should be of interest and benefit to Navy/Marine F-4 pilots.

RF-4C Out-of-Control Recovery

DURING a scheduled defensive air combat maneuvering mission, the defending RF-4C entered uncontrolled flight when the student aircraft commander induced excessive aileron during a high angle of attack turn. This particular maneuver is used as a defense against a long range missile attack. A level hard turn was initiated at .9 indicated Mach. Afterburner was selected at the entry into the hard turn and mild wing rock was generated after about 30 to 40 degrees of turn. The instructor pilot in the rear cockpit directed the student to decrease the angle of attack slightly; however, the aircraft commander unconsciously countered with rapid right aileron followed by rapid, full left aileron. At this point the aircraft entered a violent, rapid roll to the right and the instructor pilot took control of the aircraft. Proper out-of-control recovery procedures were initiated. Due to the violence of the gyrations, however, neither the instructor pilot nor the aircraft commander could positively tell if the aircraft was in fact returning to controllable flight. When it appeared that the nose of the aircraft was beginning to slice across the horizon, the instructor pilot directed the aircraft commander to deploy the drag chute. The sharp tug of the drag chute was felt and a corresponding decrease in pitch attitude of 12 to 15 degrees was noted. The yawing oscillations immediately ceased and the aircraft smoothly flew out of the maneuver. The instructor pilot in the attacking aircraft was in a position to observe the entire sequence of events. He saw the aircraft snap to the right and then commence a left roll to a nose-low inverted position. He saw the drag chute deploy and force the nose another 15 degrees below the horizon before the chute separated from the aircraft. At this time he observed the aircraft recover to level flight.

Several points are highlighted by this incident. First,



the quick deployment of the drag chute resulted in an immediate recovery even when the airspeed was obviously above drag chute failure speed. Second, during a violent out-of-control situation there is a period of confusion where the aircrew is unable to determine the correct attitude of the aircraft. In this case, the instructor pilot thought that the nose of the aircraft was much lower than it was and that the nose was beginning to slice across the horizon, possibly entering into the first stage of a spin. If aerodynamic spin recovery procedures had been started at this point, the aircraft would probably have been forced into a true spin condition. Third, when the pilot feels that he will not be chastised for inadvertently entering an uncontrolled flight condition, he will not hesitate to utilize all the proper steps in the out-of-control recovery procedure. Of course, all of the above is predicated on having sufficient altitude for recovery.

TA-4F Accident Provides Some Costly Lessons

THE TA-4F took off from the air station on a syllabus instrument flight check. The instructor pilot occupied the front cockpit and the student in the rear cockpit controlled the aircraft through a simulated instrument departure and subsequent climb to FL 310.

After level off, the instructor pilot advised the student pilot that he was going to "check out" the AFCS (automatic flight control system) but that *he would not take control of the aircraft*. The student pilot acknowledged this information and the instructor pilot engaged the AFCS.

A short time later, the instructor pilot selected ALTITUDE HOLD and as he did so, the aircraft pitched nose-up to about 45 degrees above the horizon. The instructor pilot took control of the aircraft and attempted to lower the nose and disengage the AFCS. While holding full forward stick, he repeatedly pushed the AFCS emergency disconnect button on the control stick grip. The aircraft, still in a nose-high attitude, stalled and fell off on the right wing.

The instructor transmitted on the FAA Center frequency that he was having control difficulties and received an acknowledgement. He then pulled the hydraulic power disconnect T-handle and the aircraft entered an upright spin to the right. He applied anti-spin corrections but was unsuccesful in regaining control. Passing 14,000 feet the instructor pilot told the student to prepare for ejection and received an acknowledgement from the student that he was ready. He then initiated the command ejection by pulling the firing handle. The instructor pilot's seat fired and functioned properly, resulting in a successful descent by parachute. However, the student pilot's ejection seat failed to fire and the student received fatal injuries when the aircraft impacted the ground.

The subsequent investigation of the accident centered about the operation of the AFCS and the failure of the ejection seat in the rear cockpit to function properly.

The Automatic Flight Control System

A brief discussion of some aspects of the AFCS is in order here. Control of the AFCS in the TA-4F aircraft is available in one cockpit only (the front cockpit in this case). The control stick in the cockpit without the AFCS control panel (the rear cockpit) will resist any attempt made to move it when the AFCS is engaged and the stick sensor (control stick steering mode) is not energized. However, this does not absolutely prevent the use of the primary control system since the stick can be moved by overpowering the AFCS. This requires forces of about 15 pounds in pitch and 35 pounds in roll. If the system *is* overpowered in pitch, the AFCS trim system will move (trim) the horizontal stabilizer in the opposite direction of stick movement and will keep it moving until the stick is released or until the stabilizer limit switches are actuated.

The positioning of the horizontal stabilizer in the opposite direction of stick pressure can cause violent maneuvers of the aircraft when the AFCS is disengaged because of the out-of-trim condition. This appears to be what happened in this case.

The most probable sequence of events is that during the climb to altitude, the instructor pilot placed the AFCS switch in standby, preparatory to a system check. When the student pilot leveled off at FL 310, the instructor pilot placed the AFCS switch in the ON position. The student pilot (still at the controls) then felt a slight nose-up stick force input but continued to override the AFCS with stick pressures. (He was not familiar with the peculiarities of the system and was concerned only with flying a smooth instrument hop.) Within 13 seconds the automatic trim system had retrimmed the stabilizer to a full nose-up position. About this time, the instructor pilot selected the ALTITUDE HOLD mode and the AFCS disengaged, thus relieving the stick forces held by the student pilot but allowing the aircraft to pitch nose-up (because it was

LEGEND

1. M-53 booster cartridges.
2. Stainless steel braided, teflon-lined hose which conducts gas from the M-53 booster cartridges, at the appropriate time in the ejection sequence, and fires the rocket catapult.
3. Base of rocket catapult.
4. Rocket catapult launch tube.
5. Actuator mechanism.

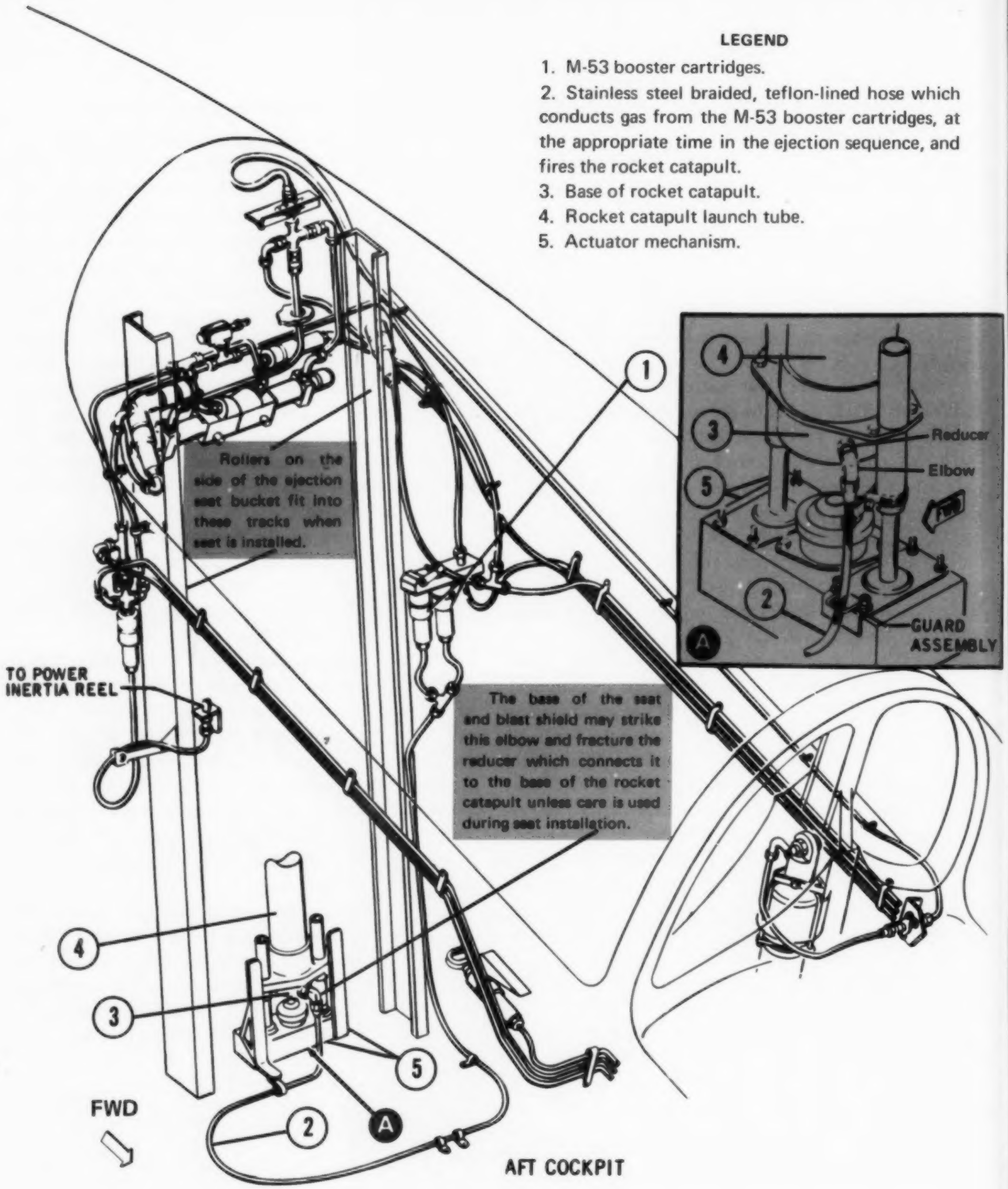


Fig. 1
TA-4F aft cockpit simplified view of certain components of typical ESCAPAC IC-3 Ejection Seat System

trimmed full nose-up) and enter the post-stall gyration. The instructor pilot's consideration of the situation was dominated by his thought that the problem was caused by an AFCS malfunction and as he took control of the aircraft he immediately attempted to disengage the AFCS by depressing the override button on the control stick grip. (He did not check the trim indicator nor did he attempt to operate the trim switch.) Simultaneously, he applied full forward stick in an attempt to lower the nose but before the nose could be lowered, the airspeed dissipated and the aircraft departed from controlled flight. As the aircraft departed, the instructor pilot disconnected the powered flight controls but this action was ineffectual in assisting in the recovery.

A review of the TA-4F NATOPS Manual following this accident indicates that it is inadequate in its treatment and explanation of the AFCS. As a result, a proposed change to the NATOPS Manual has been submitted which warns and elaborates on the potential problems that can arise if the aircraft is controlled from the rear cockpit with the AFCS engaged in the front cockpit.

The Ejection Seat

This aircraft had ESCAPAC IC-3 seats installed in both cockpits. In the normal operation of the ejection seat (command ejection) there is a point in the ejection sequence where two M-53 booster cartridges in the rear cockpit (item 1, fig. 1) are fired by gas pressure from the rocket catapult initiators. The firing of these booster cartridges generates gas pressure which travels through a stainless steel braided, teflon-lined hose (item 2 fig. 1) to the base of the rocket catapult (item 3, fig. 1) where the gas pressure forces a firing pin into a primer which fires the rocket catapult. At the same time, gas from the rocket catapult initiators is routed through another line to the front cockpit where it activates the ballistic delay initiator of the forward seat. The operation of the delay initiator provides a 0.4 second delay (to permit the rear ejection seat to clear the aircraft first) and then fires two M-53 booster cartridges in the front cockpit which, in turn, fires the front seat rocket catapult in the same manner as the rear seat was fired.

What happened in this case? Why didn't the rear seat fire as programmed? The most likely cause appears to be a fractured reducer fitting which normally connects the stainless steel braided, teflon-lined flex hose (item 2, fig. 1) to the base of the rocket catapult (item 3, fig. 1). The other end of this flex hose is connected to the M-53 booster cartridges (item 1, fig. 1) and as already mentioned, conducts gas pressure from the M-53 booster cartridges to the rocket catapult, actuating a firing pin which strikes a primer in the base of the rocket catapult.

It is suspected that the fractured reducer fitting (discovered in the aircraft wreckage) existed at the time the ejection was attempted. If this was the case, the gas from the M-53 booster cartridges would have been vented directly to the cockpit, at the end of the flex hose (at the point where the reducer was fractured) and thus could not actuate the rocket catapult firing pin and primer as it was designed to do. Thereafter, when the 0.4 second delay initiator in the front cockpit timed out, the front seat fired as programmed.

Photos 1 through 5 are provided for clarity. Photo 1

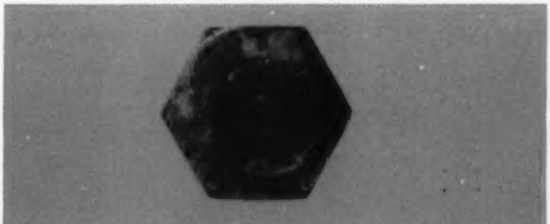


Photo 1
View of failed reducer.

shows the reducer which failed in the aircraft. Photo 2 shows the steel elbow which attaches to the end of the reducer (on the end opposite from that which screws into the base of the rocket catapult). A close look at

Photo 2
View of elbow assembly. Note that a portion of the failed reducer is visible in the end of the elbow assembly.

photo 2 will show that part of the fractured reducer is still screwed into the steel elbow attached to tne end of the flex hose. For purposes of comparison, photo 3

shows a fractured reducer which was deliberately failed in a laboratory and photo 4 shows the stainless steel elbow at the end of the flex hose (with a part of the laboratory-failed reducer still screwed into the elbow). Figure 5 shows the rocket catapult cartridge (which is at the base of the rocket catapult) and provides a good view of the opening into which the reducer fitting is installed in an operational seat.

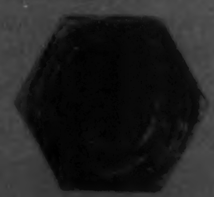


Photo 3
View of laboratory failed reducer.

Photo 4
View of the elbow assembly. Note that a portion of the laboratory failed reducer is visibile in the end of the elbow assembly.

Maintenance records reviewed during the investigation showed that the seat in the aircraft had been removed and replaced during a routine calendar check 13 days prior to the accident. In an effort to discover possible reasons for the fracture of the reducer fitting, an inspection was made of the seat removal/installation procedures in use in the squadron. This inspection revealed:

- Each of the first four seats inspected were heavily scored at the base of the seat and the blast shield.

- During seat removal and installation, the base of the seat may come in contact with the elbow (which connects to the reducer fitting) if care is not used to position the elbow properly. When this occurs, maintenance personnel (without an adequate knowledge of the reason for the obstruction to the seat installation) may tend to force the seat into the full down position.

This accounts for the scoring at the base of the seat and the blast shield – and is also the most likely reason for the fracture of the reducer fitting.

- Applicable MRCs (maintenance requirement cards) which provide guidelines for seat removal and installation were reviewed. There were no cautions or warnings regarding the critical role of the steel elbow/reducer fitting or the necessity to insure against damage during seat removal/installation.

A complicating factor in the problem of elbow/reducer fitting and seat clearance is that the rocket catapult launch tube (item 4, fig. 1), when installed on the seat actuator (item 5, fig. 1), is not a completely rigid installation. That is to say, the rocket catapult launch tube can be twisted slightly – in one direction or the other with the result that the elbow/reducer fitting may be rotated slightly forward where it can interfere with the seating of the seat bucket during installation.

The problem of elbow/reducer fitting interference with the seat has not been unrecognized in the past. IACB (Interim Aircrew Systems Bulletin) No. 125 was issued in Oct 1967 and provided for the inspection and modification of seats so as to provide an additional .050 inch clearance between the blast shield and the reducer coupling elbow. Subsequent reports indicate that this did not completely eliminate the problem.

IACB No. 241 (applicable to ESCAPAC IC-3 and IC-6 ejection seats) was issued on 31 October 1969 and provided for:

- An inspection of all seats for failed reducers.

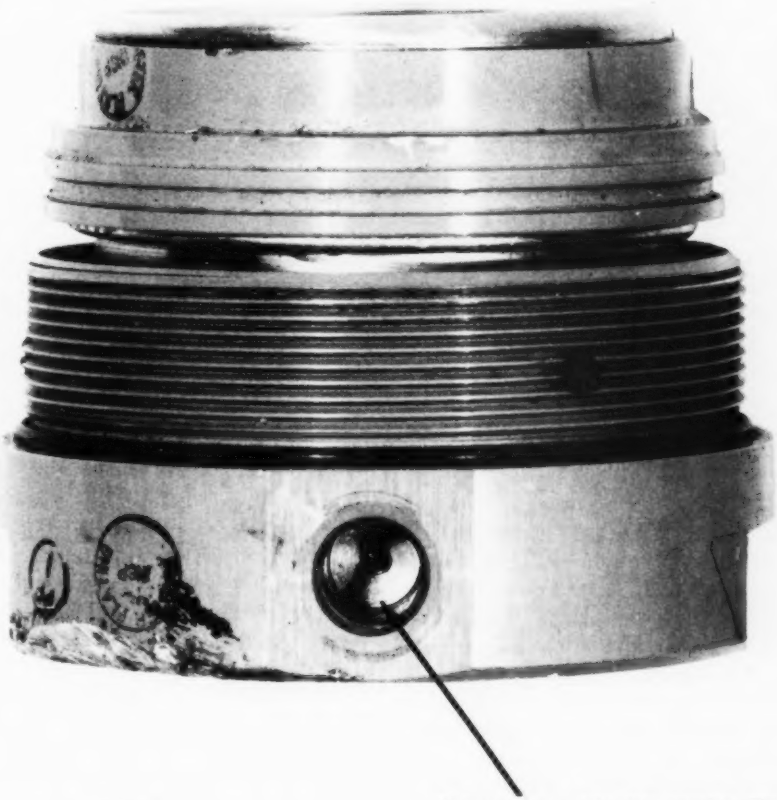


Photo 5
View of rocket power cartridge (from rear cockpit).

Reducer screws into this opening. The other end of the reducer screws into the elbow on the end of the stainless steel braid, teflon-lined hose which conducts gas from the M-53 booster cartridges to the rocket catapult.

• An inspection for kinked or damaged initiator hoses.

• An inspection to insure that the reducer which is installed is of the proper type, i.e., that it is steel and not aluminum.

• In the case of new installations – the installation of a strap around the left-hand seat actuator mechanism and the hose assembly elbow in such a manner that the rocket catapult launch tube will be properly positioned (and remain positioned) so that there will be adequate clearance between the elbow/reducer fitting and the seat during seat installation.

Lessons Learned

This accident once again points up the complexity of modern aircraft systems and emphasizes the absolute requirement for maintenance personnel and aircrewmen to have an indepth understanding of the aircraft sytems which they operate and maintain. ◄

'Are we pitchlocked?'

THE WIND was calm as the P-3A commenced its takeoff roll down the slightly wet runway. The power check at 80 knots showed 4300 horsepower across the board and when the PPC questioned the flight engineer, he reported "Power checks good." At 120 knots (rotation speed) and with about 4000 feet of runway remaining, the PPC (occupying the copilot's seat) called "Rotate." As the pilot pulled back on the control column, a loud bang was heard, accompanied by an air noise in the cockpit. (It was later determined that this noise was caused by a popped smoke removal hatch and the resultant windblast.)

The general nature of the problem was recognized by the PPC and, although a popped smoke removal hatch can easily be closed in flight, the PPC took control of the aircraft and called out, "Abort! I have it." The nose of the aircraft was lowered to the runway by the PPC and the power levers were retarded from full power to full reverse. (About 3000 feet of runway remained at this time.) No reverse thrust was noted or felt, nor did the aircraft begin to decelerate as expected.

The PPC asked, "Are we pitchlocked?" The flight engineer replied, "Negative," even though there were no beta lights (which would have indicated that the props were in the reverse range). The PPC then took the power levers rapidly back up to the beginning of the flight range and right back over the ramp into full reverse.

No changes in engine sound, instrument indications or rate of deceleration were noted. The flight engineer at this time noted low fuel flow, low TIT (turbine inlet temperature) and low horsepower on all four engines. He visually checked the pitchlock reset circuit breakers and reset them when he found them pulled. The PPC commenced pump-braking the aircraft with 2300 feet of runway remaining and airspeed in excess of 110 knots. The PPC noted that the available braking was not decelerating the aircraft sufficiently to stop on the runway and elected to take the aircraft off the left side of the runway into a grassy area.

The aircraft was braked and steered off the runway at a point between the threshold lights and the last runway light. It then skidded (in about a 30-degree left crab) into the grass at about 80-100 knots. The right wing separated from the fuselage shortly after the aircraft left the runway; the aircraft continued ahead for about 200 feet, yawing to the right, crossed a parking pad and finally came to rest facing about 180 degrees to the direction of the skid. The right wing (which had separated) was on fire and the right wing stub on the aircraft itself was also burning.

The crew exited rapidly through the port overwing escape hatch and the port flight station emergency escape hatch and withdrew to a safe distance. The No. 2 engine was still running and was secured by the PPC using the emergency shutdown lever as he left his seat to exit from the aircraft. The crash/fire crews arrived within minutes to extinguish the blaze which had now spread to the interior of the aircraft. The fire was immediately brought under control but about two hours were required before the interior blaze could be completely extinguished. The aircraft sustained strike damage.

A thorough investigation was conducted following this accident but space does not permit a full discussion of all the factors involved. However, the pertinent causes of this accident can be summarized as follows:

- The aircraft commander's decision to abort the takeoff after reaching rotation speed because of a popped smoke removal hatch was considered to be incorrect.
- The flight engineer had pulled the pitchlock reset circuit breakers upon securing the aircraft the night prior to the day of the flight on which the accident occurred. (Note: These circuit breakers are not on the secure checklist and should not have been pulled.) The flight engineer then failed to make the pitchlock reset system operational prior to the next flight (he failed to push in the circuit breakers). This allowed the engines to pitchlock at an airspeed where normal reverse thrust was expected to be available.
- The PPC failed to recognize the four-engine pitchlock condition that he encountered when he selected full reverse thrust and the flight engineer contributed to this failure. That is, when the PPC asked, "Are we pitchlocked?" the flight engineer incorrectly

informed the pilot on the significance of the engine indications (low fuel, low TIT, low SHP (shaft horsepower) and 100 percent rpm) by replying, "Negative." He also failed to call out that there were no beta lights on any of the four engines which would have provided the pilot with another indication of blade angle. In addition, he failed to inform the PPC that the pitchlock reset circuit breakers had been out and that he had pushed them in *during* the abort situation.

P-3 Prop Pitchlock Reset System Considerations

This mishap emphasizes the serious accident potential when *improper* procedures are employed in connection with the P-3 prop pitchlock reset system. One air wing commander expressed concern that the procedures now set forth in the P-3A/B MIM (Maintenance Instruction Manual) (Para 6-52, page 6-12 of NavAir 01-75PAA-2-1) for securing the aircraft in high wind conditions could possibly lead to further mishaps such as this. The referenced paragraph prescribes that props be feathered during high wind conditions to prevent windmilling. With power levers in START as prescribed by NATOPS engine shutdown procedures, feathering the props allows the pitchlock reset solenoids to be activated by the battery. There are two alternate actions prescribed to prevent battery depletion under these conditions:

- Advance power levers into the FLIGHT range and pull the prop pitchlock reset circuit breakers.
- Disconnect the battery.

The air wing commander stated the opinion that pulling the pitchlock/reset circuit breakers is unnecessary since the pitchlock reset system cannot be activated with the power levers in the FLIGHT range. He also noted that if the circuit breakers are pulled and this status is overlooked, props could pitchlock as the power levers are rapidly retarded into the beta range during an aborted takeoff situation. The result would be forward thrust instead of the desired reverse thrust. It was, therefore, recommended that the (alternative) requirement in the MIM to pull the prop pitchlock reset circuit breakers (when the P-3 props are feathered for parking in anticipated high wind conditions) be deleted from the MIM. NavAirSysCom msg 021829Z of Oct 69 concurs in this deletion and notes that NavAir 01-75PAA-2-1 will be revised accordingly. This message also notes that it is not necessary to disconnect the battery *in addition* to advancing the power levers beyond FLIGHT IDLE as this latter action will break the circuit to the reset solenoid. NavAirSysCom has recommended that this information also be made an agenda item at the next P-3A/B NATOPS review conference for inclusion in NATOPS flight manuals.

‘Stand Clear of Intakes and Exhausts!’

AN A-7E was parked in the fuel pits with its engine at idle power and tail into the wind. The plane captain removed the nose landing gear downlock safety pin from its stowage space in the step. He then shifted the pin from his right to his left hand, decreasing the distance between the pin and the aircraft's engine intake as he did so. At this time, a gust of wind caught the safety pin warning flag (about 40 inches long including its attaching cable), extending the end of the flag to a point in front of the intake. The suction of the engine jerked the pin from the plane captain's hand and both the pin and the flag went down the intake. Fortunately, the safety pin and warning flag went out the bypass air passage after passing through the fan section of the engine limiting damage that would otherwise have been extensive.

Personnel Hazards are Great

More important than the possibility of ingestion of safety pins by jet aircraft is the possibility that personnel can be sucked into intakes if they disregard precautions when working around them. The reality of this hazard is evident from the report of an accident on board a carrier which resulted in the death of a catapult-safety petty officer.

In this case an A-6A was positioned on the catapult. The "turnup" and "tension" signals were given by the catapult director and the pilot responded by advancing the throttles to 100 percent. The catapult topside-safety petty officer was beneath the fuselage forward of the intakes checking the nose tow for correct position during the catapult tension evolution. The nose tow engaged the shuttle correctly and the safety petty officer exited the area to the left. As he cleared the radome, he threw up his right arm indicating that the catapult hookup was correct. In so doing, he rose in front of, and was immediately sucked into, the port engine intake.

The investigation revealed that the catapult-safety petty officer failed to follow the correct route in making his exit from beneath the aircraft. Jet aircraft intakes are deadly personnel hazards and must be given constant attention when work is being performed near them. A fractional moment of forgetting can be fatal.

BEWARE JET INTAKES. ◄

MURPHY'S LAW*

UH-2 ASE Input Lever Murphy

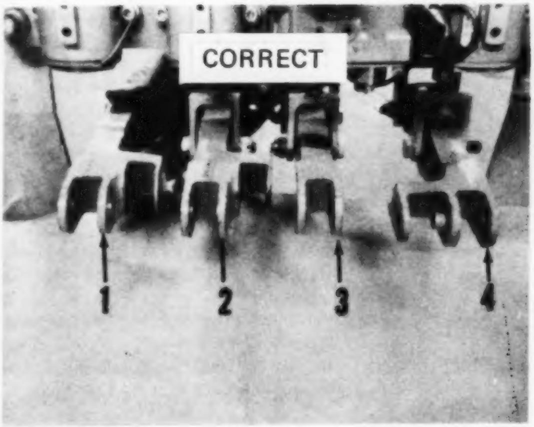


Photo A

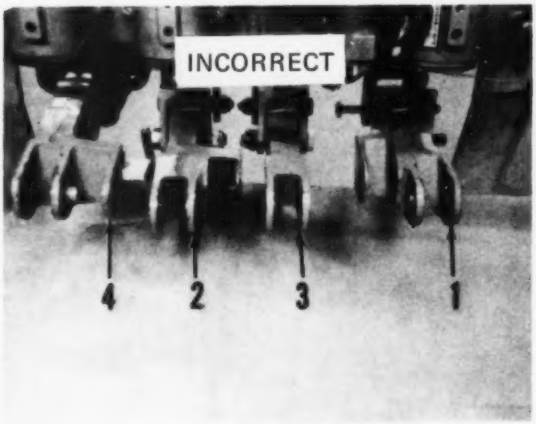


Photo B

APPROACH is indebted to KAMAN for the photographs and the explanation of control rod adjustments when a new or overhauled ASE (automatic stabilization equipment) unit is installed in the UH-2.

Since levers 1 and 4 can be reversed, it is doubly important to make sure that the correct part numbers are closely checked. (It might be a good idea to color code the parts or stamp "This side UP" for additional identification.)

Prevent a Murphy – do the job right!

Reprinted from the Aug/Sep/Oct 1969 issue of *KAMAN Rotor Tips*.

ASE Input Lever Check (UH-2)

Normally only minimal control rod adjustments (rigging) are necessary when a new or overhauled ASE unit is installed in a UH-2. Therefore, if it appears that considerable adjusting is necessary, check for improper installation of the ASE input levers. In Photo A, the input levers, items 1 through 4, are correctly installed. Photo B shows two of the levers incorrectly installed – levers 1 and 4 have been transposed. The best method of determining this condition is to check the part numbers. However, a visual check of lever position will also aid in this determination. For example: the offset clevis on all double-ended levers must face toward the center of the ASE and the two identical levers (l & 2) must be adjacent to each other on the left side as shown in Photo A. If one or more offset clevis were positioned facing outboard or were installed so that the two identical levers were not located on the left side, the installation would obviously be wrong. The part numbers for the levers are: levers 1 and 2, P/N 18175-1; lever 3, P/N 18172, lever 4, P/N 18177-1. For further information, refer to NAVAIR 0l-260HCA-4-1 and NAVAIR 01-260HCB-4-3.

* If an aircraft part can be installed incorrectly, someone will install it that way!

LETTERS

Drive carefully. It's not only cars that can be recalled by their maker.
Safety Review

SEEK Kit

FPO, San Francisco – VP-28 recently inspected all SEEK-2 kits held by this command because of the problem of insect repellent leaking and damaging the contents of the kit and the outer container itself. We found four units in custody of flight crewmembers and 15 units held in inventory by the Aviation Equipment Branch, all in varying stages of deterioration.

Have you had similar complaints from other units using this type kit and does the kit have an established shelf life?

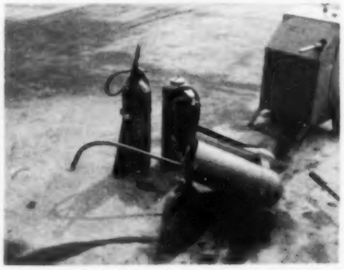
LCDR C. S. Bradley
ASO, VP-28

• This is apparently a widespread problem. The NADC (Naval Air Development Center) advises that a new SEEK kit will be issued to replace the present SEEK-2 kit. The new kit will contain roughly half of what is in the present unit, the theory being that it should be able to sustain life for 24 hours. In the meantime, NADC suggests that holders of the present SEEK-2 kit open the packages, take out the insect repellent and if the rest of the items are not affected, continue use of the kits. If items have been damaged, draw a new kit. When you draw a new kit, take out the insect repellent before the same thing happens again.

We suggest that your squadron and others with the same problem submit a UR on leakage of the insect repellent.

Grounding Boarding Ladders (and other things)

NAS Memphis, Tenn. – The letter from VA-216's ASO in the October issue was very interesting. We here at NARTU Memphis have been using a similar procedure for over a year; however, instead of tying the strap onto the ladder itself, it is secured to a padeye located on the ramp. Then when the ladder is



removed from the aircraft, it is then secured to the deck with the strap which in turn is permanently attached to the padeye. In this way, there is no possibility of the strap coming off the ladder and being sucked into an engine intake during ground runup. In addition, we have also "grounded" the fire bottles by using the same procedure. A two bottle portable cart which was locally manufactured (see photos) is placed between every third aircraft and secured utilizing the same type strap. The cart contains one CO_2 bottle and one P-K-P bottle for maximum firefighting flexibility. NARTU Memphis has also established a program whereby all personnel receive firefighting refresher instruction annually by qualified instructors from the Crash and Rescue School located here at NAS Memphis.

LCDR R. C. Adams
ASO, NARTU Memphis

P.S. The padeyes have been kept clean since starting this procedure.

• Your letter provides good dope for use on any aircraft line. It looks as if NARTU Memphis has the situation well in hand. Good show!

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.
Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Orange Nomex

Time: Warm afternoon
Place: NAS Boondocks
Action: Pilot mans A-4 for low level navigation mission
Costume: Indian orange flight suit

Time: Two hours after takeoff
Place: Oregon pine forest
Action: SAR helo from local base hovers over trees and sends crewman down to recover unconscious pilot
Costume: Indian orange flight suit which is how the SAR people located the pilot in the green foliage

NAS Lemoore, Calif. – My "Scenario for Survival" above is a bit modified and extended from your article of the same title in the September 1969 APPROACH

but it brings up a favorite question in my squadron: Why do the nomex flight suits have to be green?

None of our pilots would disagree with the dark green suits for combat flying and its attendant potential for possible evasion on the ground. However, the bulk of the Navy's flying is not done in a hostile environment and there is certainly no need for remaining undetected in ConUS. The opposite is true. I, for one, would like to be picked up as quickly as possible and anything I can do to be more visible to my rescuers is important.

This doesn't mean to bring back the old *cotton* orange suits. I am a believer in nomex. I visited the pilot who had the cockpit fire ("Nomex," page 35, August 1969 APPROACH) while he was in the intensive care ward at Brooks Burn Center. Any nonbelievers, as I once was, should have to do the same. So make it nomex but *orange* nomex. The company's advertising says they can make nomex any color and aircrewmen are allowed two flight suits. Why not at least one of them orange?

LT R. R. Powell
VA-125

• NAVSAFECEN shares your feelings for an orange nomex suit. However, at the last APSET (Aviation Personal and Survival Equipment Team) meeting, Fleet representatives were opposed to this idea. Perhaps the next similar type meeting will bring a reverse in the decision and we will get nomex "Pumpkin Suits" back in the locker again. Along this line, you might have heard reference made to the fact that the Air Force is getting them. This is true but misleading – only non-deployable units such as the Air Defense Command will have orange nomex. Cost of a two-color wardrobe is a definite consideration. Anyhow, we'll keep talking it up.

Four Time Award Winner

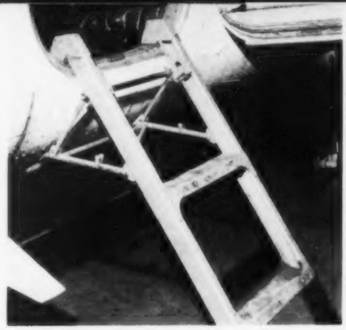
FPO San Francisco, Calif. – In keeping with the continuing efforts toward aviation safety, I thought it might be newsworthy to advise you that VADM A. M. Shinn, ComNavAirPac, presented VA-192 its fourth consecutive CNO Safety Award. The presentation took place aboard USS Oriskany (CVA-34) in the Gulf of Tonkin, on 13 Oct. 1969. CDR J. K. Stanley, our commanding officer, accepted the award. VA-192 has logged 30,447 flight hours and 11,580 arrested landings during 55 accident-free months. No other jet carrier squadron has ever achieved this record. During the past four years we have completed four combat cruises off Vietnam.

LTJG O. A. Whitten,
PAO
VA-192

• Congratulations are in order to all of you *Golden Dragons* for this great record! You now belong to an elite group of *two*. VF-33 also won four consecutive awards from '62-'65 and, in very recent years, VF-213 had a streak of three between '66-'68.

How Say You, Stoofmates?

Corpus Christi, Tex. – Since the beginning of time man has been fighting the battle against slippery surfaces underfoot. S-2 pilots and aircrewmen know that the gluteus maximus is often on the losing end of the battle when it



comes to the entrance ladder of this venerable Grumman aircraft. The time honored solution to this "slithery" situation has always been an application of aircraft walkway compound. This compound is not only expensive, it is difficult and time consuming to apply. Once applied, it chips off easily exposing the underlying smoothly polished metal surface, which has been the downfall of many an intrepid aviator or sailor with a wet or oily boot. 47

VT-27 has a better idea. It's shipboard type self-adhesive nonskid, FSN 9Q 7210-205-0389. Sixty cents buys a 6 x 24 inch strip which is enough for two aircraft ladders. Application requires about 15 minutes and it doesn't come off under normal use.

We would consider it an honor to have our idea appear in your magazine because we feel that many S-2 operators will benefit from this safety tip.

S. P. Bogdewic
LTJG USNR
PAO

• As the photographs plainly show, it looks like VT-27's idea has considerable merit. It would be well worth a try even at twice the price – or three – or four – or etc!

Vol. 15 **approach** No. 8

RADM Roger W. Mehle

Commander, Naval Safety Center

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

Contents

Departments

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Next Month

Tony LeVier talks about 'The Thing'

Credits

Cover artist Blake Rader's painting gives us the real You-Are-There feeling with his treatment of that moment of truth in naval aviation: the carrier landing. **Pg 24** Art by Walter Dey of Grumman NATOPS, Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y.

Civis Sum Aeris

(I am a Citizen of the air)

AS a professional pilot, I recognize my obligations:

1. To the public which entrusts its safety to my skill and judgment.
2. To my fellow pilots who mutually depend upon me to follow established good practice.
3. To my crewmembers who look for me to exercise my best judgment and leadership.
4. To my co-workers who constantly are striving for greater achievements and general overall improvement in aviation.
5. To my organization which entrusts me, in the conduct of my flights, with moral and economic responsibilities.

To discharge these obligations, I will at all times observe the highest standards of my profession.

- I never will knowingly jeopardize the safety of a flight by undertaking a risk to satisfy personal desires, nor will I fly when my mental or physical condition might lead to additional or unnecessary risk.
- I will use all means at my disposal to assure the safety of every flight, both as to my assigned duties and those of my fellow crewmen.
- I will continue to keep abreast of aviation developments so that my judgment, which depends largely on such knowledge, may be of the highest order.
- My deportment, both on duty and off, reflects my respect for my profession and for my country, and it shall be such as to bring credit to both.
- I pledge adherence to these principles for the advancement of aviation and to further the dignity of my profession.

Ethics are not learned by teaching; they are inculcated by example and by experience. To a man of honor, "ethics come as naturally as good table manners."

PRACTICE

Sound
Aviation
Fundamentals
Every
Time
You fly

because

Sound
Aviation
Fundamentals
Eliminate
Terrifying
Yarns

and

Sound
Aviation
Fundamentals
Extend
Thy
Years

Contributed by LT C. G. Ehalt, ASO VW-4

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